UGANDA PROTECTORATE.

ANNUAL REPORT

OF THE

DEPARTMENT OF AGRICULTURE

FOR THE

YEAR ENDED 31ST MARCH, 1920.

Published by Command of His Excellency the Governor.

ENTEBBE:

PRINTED BY THE GOVERNMENT PRINTER, UGANDA.

1921.

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6076—400—24-2-1921.

UGANDA PROTECTORATE.

DEPARTMENT OF AGRICULTURE.

		P.O. Box No.	*Telephone No.*
Head Office	Kampala ...	53	15
Veterinary Office and Laboratory	Kampala ...	63	12
Entomological Office and Laboratory	Kampala ...	5	25
Botanical Office and Laboratory	Kampala ...	5	26
Botanical Gardens and Meteorological Office ...	Entebbe ...	60	38

Experimental Plantations:--

(1) Kampala.
(2) Kakumiro, Mubendi.
(3) Simsa, Soroti.
(4) Fort Portal, Toro.
(5) Kumi, Teso.
(6) Serere, Teso.

ANNUAL REPORT, 1919-20.

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STAFF LIST.

Director of Agriculture ... ... S. SIMPSON, B.SC., (EDIN.), M.R.A.S.E., N.D.A.

Deputy Director of Agriculture ... ... L. HEWETT, M.R.A.C.

Clerks:

A. S. WIDGERY. H. G. SMITH.

GENERAL DIVISION:

Senior District Agricultural Officers:

R. G. HARPER. A. R. MORGAN.

District Agricultural Officers:

T. D. MAITLAND. J. D. SNOWDEN.

Assistant District Agricultural Officers:

C. HAZEL. P. CHANDLER. Capt. HARMSWORTH, M.C.

Ploughing Instructor ... ... A. FISHBURN.

BIOLOGICAL DIVISION:

Entomologist ... ... C. C. GOWDEY, B.SC., F.E.S., F.Z.S.

Botanist ... ... WM. SMALL, M.B.E., M.A., B.SC.

BOTANICAL DIVISION:

Curator, Botanic Gardens, Entebbe ... ... T. D. MAITLAND.

VETERINARY DIVISION:

Chief Veterinary Officer ... ... E. HUTCHINS, M.R.C.V.S.

Veterinary Officers.

U. F. RICHARDSON, B.SC., M.R.C.V.S. W. F. POULTON, M.R.C.V.S.

R. L. L. HART, M.R.C.V.S. T. BOWHILL, M.B.E., F.R.C.V.S.

A. V. MEEKE, M.R.C.V.S.

Stock Inspectors:

H. A. STRAUSS. F. A. POESTKOKE.

L. A. GOULD. J. J. VICTOR.

Supernumerary Stock Inspector ... ... F. STRAUSS.

Indian Veterinary Assistants:

FAKHAR-UD-DIN. FAZAL-UD-DIN-AHMEDI. SHEIK INAYAT ULLAH.

CLERICAL STAFF:

Clerks:

J. X. DE MELLO. W. NORONHA. J. J. FIALHO.

J. C. DE SOUZA. G. E. W. JAYASEKARA.

ANNUAL REPORT

OF

THE DEPARTMENT OF AGRICULTURE,

UGANDA PROTECTORATE,

For the Year ended 31st March, 1920.

Staff.

The Director of Agriculture was away on leave practically the whole year, returning on the 26th March.

Mr. L. Hewett, Deputy Director of Agriculture, was in charge of the Department throughout the year.

Mr. A. R. Morgan, Senior District Agricultural Officer, went on leave on the 21st May, 1919, and returned on the 31st March, 1920.

Mr. T. D. Maitland, District Agricultural Officer, was transferred to the East Africa Protectorate on the 17th February, as Chief of the Economic Plants Division in the Department of Agriculture.

Mr. Maitland was Acting Chief Forestry Officer from 4th September to 4th February, in addition to his other duties.

Mr. J. D. Snowden, District Agricultural Officer, went on leave on June 19th, and was away at the end of the year.

Messrs. C. Hazel and P. Chandler arrived on first appointment as Assistant District Agricultural Officers on 5th December, 1919.

Captain J. S. Harmsworth, M.C., arrived on the 23rd February on appointment as Assistant District Agricultural Officer.

Mr. A. Fishburn arrived on appointment as Ploughing Instructor on 1st February.

Mr. H. G. Smith was appointed clerk, and arrived on 5th December, 1919.

General.

The past year was again one of exceptional strain in the Agricultural Department, and the staff was depleted to the lowest possible limit necessary to prevent disorganisation. But in spite of this, progress is to be recorded, although expansion in new directions was still further delayed. Many districts, however, were completely neglected by the European Staff with the exception of occasional visits.

Weather conditions were generally unfavourable in the early part of the year, and famine relief had to be resorted to in many parts of the country, particularly in the Eastern Province.

Labour for work on plantations was again difficult to obtain, and a constant shortage of labourers for ordinary plantation upkeep is reported from all parts of the country, with the exception of the Bunyoro and Masaka Districts.

Bunyoro obtains a sufficient labour supply from the West Nile and Chua Districts, whilst the Masaka District relies upon Ankole for its labour supply.

Shipping.

The shipping position for freights became more normal, but the increase of rates was an additional burden on productive industry. Fortunately prices of Uganda produce were steadily rising during the year, so that producers received an adequate return.

Exports.

The total value of the exports for the year was £1,828,537, shewing an increase of £596,595 over the previous year's total.

In Appendix No. 12 is given a comparative statement of exports during the last two years, whilst in Appendix No. 13 the figures are given for five years.

In Appendix No. 14 are given the export figures from all ports and railway stations in the Protectorate, and it must be noted that inter-port or station traffic within the Protectorate is not recorded in the table.

The principal products in the export table are represented by the following, and the percentage of each compared with the total exports is given :—

			£		
Ginned Cotton	...	130,464 cwts.	... 1,209,663	=	66·155%
Hides and Calf Skins	...	52,171 ,,	... 242,238	=	13·248%
Coffee ...	...	58,960 ,,	... 161,714	=	8·844%
Ivory ...	...	161,091 lbs.	... 65,952	=	3·606%
Simsim ...	...	23,384 cwts.	... 30,697	=	1·679%
Goat Skins ...	...	4,200 ,,	... 27,870	=	1·524%
Plantation Rubber	...	388,523 lbs.	... 25,902	=	1·417%
Cotton Seed	...	105,457 cwts.	... 25,783	=	1·410%
Other Exports	...	...	... 38,718	=	2·117%
Total Exports		...	... £1,828,537		

Cotton.

This crop easily maintains its preponderance as in previous years, and a steadily increasing production can be expected in the future. Progress is reported from all parts of the Protectorate, and the industry is stable and firmly established.

The crop is grown almost exclusively by natives, although the prevailing high prices are making this crop of interest to European planters.

The following table shews the distribution of the main cotton areas :—

Eastern Province :—	Acres.	*Northern Province :—*	Acres.
Busoga District ..	28,000	Masindi District ...	1,617
Bukedi ,, ...	23,000	Hoima ,, ...	4,505
Teso ,, ...	39,000	Gulu ,, ...	1,000
Lango ,, ...	16,000	Kitgum ,, ...	50
	106,000		7,172
Buganda Province :—		*Western Province :—*	
Mengo District ...	27,000	Toro District ...	500
Entebbe ,, ...	5,999	Ankole ,, ...	1,200
Masaka ,, ...	11,700		1,700
Mubendi ,, ...	2,780		
	47,479	Grand Total (Native cultivation) ...	Acres. 162,351

European planters have 1,120 acres under cotton, chiefly interplanted with coffee, whilst the various Missions are responsible for 285 acres of cotton, and Indian planters 90 acres.

The total acreage under cotton is therefore 163,846 acres.

The Sale of the Crop.

The crop throughout the country was very readily sold at remunerative prices, but owing to lack of specie the opening of the markets was delayed.

Sales of cotton began in one county of Lango District on the 19th January and general sales throughout the Eastern Province on the 9th February.

Buganda Province began to market its cotton on the 15th March.

The delayed markets met the position admirably, and no hardships were caused either to the buyers or to the sellers of cotton.

The 32 cotton buying centres in the Eastern Province fully justified their existence, and it is proposed to make such cotton markets permanent in 1922.

In future years it is hoped to begin cotton sales much earlier than has been possible during the last few seasons.

Cotton Production.

The following figures shew the actual exports for the last five years:—

Year ending 31st March.	Bales of 400 lbs. each.
1915-16	26,226
1916-17	21,832
1917-18	27,854
1918-19	27,492
1919-20	36,530

The season 1919-20 produced the largest crop Uganda has ever grown, and is estimated to exceed 45,000 bales.

The following figures are compiled from returns of actual purchases:—

Eastern Province:—

	Bales of 400 lbs.
Busoga District ...	9,950
Bukedi „ ...	7,960
Teso „ ...	9,440
Lango „ ...	4,385
Total	31,735

Buganda Province:—

Mengo District ...	9,750
Entebbe „ ...	1,850
Masaka „ ...	1,600
Mubendi „ ...	350
Total	13,550

Northern Province:—

	Bales of 400 lbs.
Bunyoro District ...	155
Gulu „ ...	190
Total	345

Western Province Total 100

	Bales of 400 lbs.
Grand Total	45,730

Specie.

The difficulties of obtaining a sufficient amount of specie to purchase the cotton crop were intensified this season. Cotton is a cash crop, and it is sold mainly from January to March of each year, which are the last months of the Government financial year.

It is expected that the proposal, which has now been sanctioned, to alter the Government financial year to correspond with the calendar year, will help matters considerably, and that lack of specie will never again hold up the opening of the cotton markets.

The Quality of the Cotton.

A considerable amount of disease was prevalent on the cotton crop in the Lango and Teso Districts, and this had a harmful influence on the quality of the product in those areas.

Generally speaking, however, the premium of Uganda cotton over American "middling" has been very high, and in some cases 2,500 and even more points on have been realised at sales in Liverpool.

Actual sales of Uganda cotton have taken place at 59·15d. per lb., whilst over 50d. per lb. has been frequently recorded.

Picking of the Crop.

Growers are taught to keep the clean white cotton separate from the stained and dirty at picking time, and to market these qualities separately. Throughout the Buganda Province this is well done, but in the Eastern Province, except Busoga, the growers do not take sufficient care of their cotton, with the consequence that the percentage of second class cotton is far too high. It is unfortunate that the keenness to buy and obtain cotton makes buyers disinclined to be particular, and in consequence of which, in many parts of the Eastern Province dirty cotton usually realises the same price as clean white cotton.

If a small premium were paid for really good cotton in these parts of the country, the growers with such an inducement, would take a little trouble at picking time.

Cotton Ginneries.

The erection of cotton ginneries has made rapid progress, and many applications are being received for the erection of new factories. There are at present 58 cotton ginneries, of which 40 are in the Eastern Province and 18 in Buganda Province.

The particulars of machinery are as follows:—

	Total.
Power roller gins	421
„ saw gins	62
„ baling presses	26
Hand baling presses	43
Seed cotton openers	38
Seed delinters	8

The kinds of power used are steam, 25; oil, 15; suction gas, 20; whilst a few hand cotton gins are in use in out-districts.

Some ginners have much to learn about handling and ginning cotton.

It is proposed to give more attention to this matter in the future, when a system of licensing ginneries is to be inaugurated.

Cotton Seed Selection Stations.

All the selection work on cotton has been done in the Teso District, and temporary buildings only erected by this Department have been available. Unfortunately during the year the office was struck by lightning and all the records have been burnt. Money is now available from the cotton tax to erect permanent buildings on the Serere Station, and to start similar work at Bukalasa in Mengo District, Buganda Province.

Food Crops in Relation to Cotton.

As the acreage under cotton expands, the cultivation of food and other crops is increased accordingly. The natives are taught not to plant cotton on the same land two years in succession, but to keep their cotton areas clean, and as soon as the cotton crop is picked, to uproot and burn the plants. Food crops are then to be planted immediately. This is essential to reduce the risks of famine which are far too prevalent in many parts of the country.

Cotton Seed Distribution.

The whole of the cotton seed for planting purposes is distributed by the Government and 23,030 bags of 56 lbs. were distributed free of charge throughout the country. The seed distribution for next season has been on an enormous scale so that a 25% to 30% increase in production is confidently expected.

Destination of Uganda Cotton.

The bulk of the cotton goes to Liverpool for sale, but India keeps up her demands, and the following figures give the exports to India for the last five years:—

Year ending 31st March	Quantity lbs.	Value. £
1915-16	1,307,509 ...	30,251
1916-17	2,589,038 ...	104,271
1917-18	3,052,963 ...	228,999
1918-19	5,974,245 ...	519,645
1919-20	4,833,656 ...	412,550

Cotton Seed.

The question of the disposal of cotton seed has always presented some difficulty because very low shipping freights are essential. During the year 5,273 tons were exported compared with 1,662 in the previous year, but as production is expected to exceed 40,000 tons next season, it is hoped that some steps will be made to deal with such a valuable commodity.

It has been suggested to the Ginners' Association that a co-operative society should be formed amongst its members to deal with this product in a comprehensive manner, and it is hoped that the necessary action will be taken. In any case all Uganda cotton seed should be delinted, as, under prevailing conditions, the wastage of lint is very great.

The East African Protectorate and the Union of South Africa appear to offer good markets for cotton seed, but at present cotton seed cannot be exported to the Union in bulk. It is hoped, however, that arrangements will be made for Uganda cotton seed to be admitted to the Union of South Africa on the understanding that it is utilised for manufacturing purposes within one month, and if this can be done, one firm promises to take 700 tons monthly, which would be a great help to the cotton industry.

Imports of Cotton and Cotton Seed.

All imports of cotton seed are prohibited and also of seed cotton. Owing to the fact that the Pink Boll Worm *Pectinophora (Gelechia) Gossypiella* has not been recorded in Uganda, the importation of ginned cotton from Tanganyika Territory has been prohibited.

The Cotton Duty.

A tax of 4 cents per pound was imposed on all ginned cotton produced from seed planted in the Protectorate in 1918, and the proceeds of the duty were paid into a fund called "The Uganda Cotton Development Fund." The amount realised to the end of December, 1919, was Rs. 472,269 and this is to be spent as follows:—

	Rs.
Two Cotton Seed Selection Stations	90,000
Cotton Seed Stores	15,000
Public Works Department:—	
Foremen, Clerks, Tools, Plant, etc.	97,500
Improvements to Earth Roads, Buganda	27,000
Metalled Roads, Buganda	128,000
Improvements to Earth Roads, Eastern Province	40,500
Metalled Roads, Eastern Province	70,500
Gulu—Kamdini Road, Northern Province	1,500
Experiments in Motor Traction	1,500
Unallocated	769
Total	Rs. 472,269

From the 1st January the cotton duty is being paid into general revenue and it is expected that £53,400 will be realised from this source during 1920. The tax has been reduced to 3 cents per lb. for the cotton produced from the 1919 sowing, and is fixed for three years. At the expiration of that time the question of the duty will be re-considered.

Currency and Exchange.

The Uganda currency is the Indian silver rupee and cents, the normal rate of exchange being Rs. 15/- to the £1. The average price of silver in the pre-war year was $27\frac{9}{16}$d. per standard ounce, but by August, 1917, the price exceeded 43d., the level at which the bullion value of the rupee and its exchange value at 1s. 4d. (the ratio of Rs. 15=£1) are identical. In February, 1920, the London price of silver rose to $89\frac{1}{2}$d. and the exchange rates followed accordingly. During the war the production of silver decreased, but the demands for this production increased enormously, particularly from Asia. For a time at any rate, a large rise in exchange tends to stimulate the import trade and to impede the export trade, although banks are not slow to supply machinery which enables the merchant to cover his risks with an unstable exchange. A stable exchange, however, facilitates the free movement of funds to and from a country and thus assists commerce. Demands were thus made for the Government to fix the exchange and this was done by the introduction of the florin to take the place of the rupee at the rate of 10 to £1. The rupee, however, remains on a par with the florin at 10 Rs. to £1. Native wages have increased irrespective of the value of the rupee, and thus it will be seen that the production of all products where wages have to be paid are permanently increased by 50%. This is a serious problem for the planting community here, although fortunately for the country the production of cotton is hardly affected.

Coffee.

Coffee still maintains its position as the principal crop on European plantations, and during the year good crops were obtained which realised excellent prices.

The gradual rise in the rate of exchange, however, was an adverse factor. The exports were 58,960 cwts., valued at £161,714.

On European plantations there are 22,643 acres of Arabian coffee over two years old, and 2,349 acres under two years. A big proportion of the older coffee is interplanted with Para rubber, and the coffee is being gradually cleared out as the rubber reaches maturity.

445 acres are planted with Robusta coffee on European estates. Indian estates have 1,945 acres under coffee, whilst it is estimated that natives are growing 10,501 acres, but the latter give little attention to cultivation.

Insect pests on coffee did much damage, more particularly the Variegated Bug.

An interesting report on a sample of *Coffea eugenioides* grown on the Government Plantation, Kampala, is given in Appendix No. 6.

A coffee growing expert is being engaged and it is hoped that he will be available next year.

Coffee Advances Committee.

The work of this Committee came to an end during the year and no further applications for advances were made, as ordinary commercial facilities became ample to enable planters to export their own coffee crops.

The total disbursements of the Committee amounted to Rs. 23,442/83 made up as follows:—

	Rs.	cts.
Advances to Planters	16,264	85
Transport and Railway Freight	2,422	04
Shipping charges	4,660	20
Insurance	95	74
Rs.	23,442	83

Nearly all the money had been repaid at the end of the year.

Although only eleven advances were actually made, the work entailed in receiving, storing, shipping and selling the coffee, and the correspondence in connexion therewith, was fairly large.

No charges were made by the Government for the work done, which was carried out entirely by the Agricultural Department.

Rubber.

The exports of rubber are on a continually increasing scale and during the year 388,523 lbs. valued at £25,902 were produced. Prices obtained for rubber were low during this period.

Para rubber has now become the main crop on a number of plantations, and the acreage is being gradually increased. On European plantations there are 8,222 acres of Para rubber over 5 years, and 9,280 acres under 5 years old. Indian planters have 960 acres under Para rubber, whilst it is estimated that natives have 945 acres under Para, and 950 acres under other rubbers.

All the rubber except the Para has gone out of cultivation.

Insect pests on this crop are practically non-existent, but bark diseases in some areas have been serious, and demand immediate attention.

Large numbers of seeds and plants were issued during the year from the Government Plantations.

In the reports of the Botanic Gardens, Entebbe, and the Government Plantation, Kampala, details are given shewing the results obtained from various systems of tapping.

It is expected that next year the services of a rubber expert will be available.

Cacao.

The exports of cacao were 660 cwts. valued at £1,231, although the area under this crop on European plantations is 2,644 acres over 5 years old and 1,383 acres under five years. On many estates the cacao area has been allowed to go back to bush, and in many instances other crops are being substituted for the cacao. Little attention is at present being given to this crop, and the acreage is at present rapidly decreasing.

Sugar.

Sugar-cane grows well in all parts of the Protectorate, but the area at present cultivated is small. If a market can be found for the cane, the cultivation would rapidly increase. It is estimated that natives have 2,244 acres under sugar-cane, Indian planters 238 acres, and Europeans 53 acres.

The consumption of sugar in Uganda is increasing rapidly, but present import figures are unobtainable owing to the fact that our separate Customs Department has been abolished. The imports of sugar and molasses in 1914-15 were valued at £10,751; 1915-16, £12,166; and in 1916-17, 5,023 cwts. valued at £10,804.

Some planters make jaggree for local consumption but production figures are not available. The exports of jaggree (unrefined sugar) to the East Africa Protectorate last year were 432 cwts., valued at £520.

On the Government Plantation, Kampala, small areas of the following varieties of cane are available for planting purposes *viz.*:—Bourbon, Purple and Yellow, Uba, Sealey's Seedling, Java, B 3922, B 4596, B 1528 and D 74.

A small crushing plant has been purchased, and it is proposed to begin experiments next year in the manufacture of jaggree.

The information thus obtained will be of great value for future developments.

Flax.

The Empire Flax Growing Committee is anxious to extend flax cultivation, but in Uganda only experimental patches have been grown. In Appendices Nos. 7 and 8 reports on flax grown and prepared by two Uganda planters are to be found.

Flax grown and prepared on the Government Plantation, Kampala, has been sent to England, and the report is not yet to hand. Uganda shews promise of flax production, particularly in Toro, where it is hoped that a supply will become available for spinning and weaving in the School of the C.M.S. at Fort Portal.

Oil Seeds.

There is ample scope for the extensive production of various oil seeds, particularly ground-nuts and sim-sim, but up to the present, exports have been on a small scale. Both these crops work in well to rotate with cotton, and add to the local food supplies when necessary.

During the year 23,384 cwts. of sim-sim were exported to the value of £30,697.

Miscellaneous Crops.

Under this heading the following can be included:—Rice, maize, wheat, tea, chillies and tobacco. They are all established crops, and will quickly repay any time and attention that is devoted to their extension. Through the efforts of the district officers, large areas have been planted with cassava as a safeguard against the too frequent shortages of native food supplies.

Miscellaneous Products.

Many enquiries are being made with reference to the manufacture of paper, and paper pulp from elephant grass, and also for the preparation of power alcohol from some of the many natural resources of the country. A little experimental work on both products has been done already.

Distribution of Plants and Seeds.

Large numbers of plants and seeds are distributed from all Government Plantations to every part of the Protectorate. The Botanic Gardens, Entebbe, distributed the following:—

PLANTS.			SEEDS.		
Economic.		Decorative.	Economic.		Decorative.
Various. 3,511	Para Rubber. 8,000	2,752	Various packets 81	Para Rubber 165,400	105 Packets 110 Single seeds.

The Government Plantation, Kampala, distributed the following:—

	Plants.	Seeds.
Para Rubber	65,100	32,000
Coffee	—	34 lbs.
Tea	3,550	2,050
Fruit trees	692	—
Decorative	1,354	1 packet.
Maize	—	460 lbs.

Sugar-cane 3,484 canes for planting.

Ploughing.

A new ploughing instructor arrived in December, and thus it has been possible to open more ploughing schools in the Teso and Lango Districts. It is expected that schools will be started in Bukedi and Busoga, as the popularity of ploughs in the Eastern Province is increasing. Diseases of cattle, however, have been very prevalent during the year.

Live Stock.

It is to be regretted that it has not yet been possible to begin a Live Stock Farm for improving the standard of various kinds of domestic animals.

The need for such a farm is very urgent, and the possible benefits likely to accrue from its establishment would be of far reaching effect on the live stock industry.

Government Plantations.

These include the Kampala Plantation which is devoted mainly to rubber, coffee, cacao, sugar-cane, tea and other crops of economic importance.

The Botanic Gardens, Entebbe, where experiments are carried out on the oldest Para rubber and cacao in the country. Decorative plants and fruit trees are also raised and propagated. The meteorological work of the country is carried out here.

Simsa Plantation, Soroti, Serere Plantation which has just been started, and the plots at Kumi, are centres where cotton selection is carried out, and where various native food crops are cultivated.

Kakumiro Plantation, Mubendi, is chiefly concerned with coffee and rubber.

Fort Portal Plantation, Toro, is quite small, and coffee, wheat, tea, etc., have been put in.

Reports on these Plantations giving details of work done are enclosed, with the exception of Kakumiro and Fort Portal, which have been in charge of native headmen throughout the year.

Veterinary.

The report of the Chief Veterinary Officer is enclosed. Cattle diseases have caused great havoc during the year, and a big scheme for cattle conservation is now being carried out.

Entomological.

The Entomological report is enclosed.

Botanical.

The Botanist's report shews that much investigation work has been carried out on bark diseases of Para Rubber.

Imperial Institute and Kew.

As in previous years, numerous specimens of plants and products have been forwarded to the above Institutions, and some of the reports are given in the Appendices. The Directors are thanked for their help, which is highly appreciated.

Plant Pests Board.

The work of the Board has been quiescent during the year, which is to be regretted, as much remains to be done.

The Factories Board.

The Director of Public Works is the Chairman, and the Medical Sanitary Officer is the Executive Officer of this Board, which meets monthly in the Agricultural office. The Board's work consists in regulating the building, erection, etc., of factories and machinery from the stand-point of health and sanitation.

Much work has been done owing to the large increase of cotton ginneries.

The Produce Protection Ordinance.

Planters complain that the present rules in force are powerless to stop thefts of coffee, and recommend the registration of all plantations together with coffee markets. Various suggestions have been put forward, but new rules have not yet been promulgated.

Kampala Swamp.

An average of 10 labourers only was employed by this Department during the year.

The work consisted mainly in keeping the planted area clean, and making a small extension to the sugar-cane plots.

Agricultural Statistics.

These are given in the Appendices, and the figures can only be regarded as approximately correct. The statistics are divided into four sections, *viz.*:—

Native, European, Indian, and Mission Agriculture, and thanks are recorded to all who have helped in their collection.

Meteorological Returns.

These are to be found in the Appendices. Fuller particulars are printed in the Blue Book.

Conclusion.

The work of the Department has been carried out under great difficulties, and special thanks are due to Mr. L. Hewett who acted as Director of Agriculture during the year, and to all the members of the staff.

S. SIMPSON,

Director of Agriculture.

ANNUAL REPORT

ON THE

GOVERNMENT PLANTATION, KAMPALA.

From the time I proceeded home on leave at the beginning of May, the Plantation was in charge of Mr. Maitland, District Agricultural Officer, until the end of January, when it was taken over by Mr. Hazel, Assistant District Agricultural Officer, who remained in charge until the end of the year.

Labour.

2. There was a shortage of labour at the beginning of the year, but from July onwards there was sufficient to meet requirements, the majority of it being local labour. It was necessary to continue the supply of "posho" to the men not locally engaged, but the rate was reduced from the beginning of November.

Meteorology.

3. The rainfall for the year under review was the lowest yet recorded. The early rains were very short, and June and July were disappointing months. The late rains were better, and there was some good growing weather between August and December. January was drier, and February was a very dry month.

The comparative rainfall figures for the last six years are given in the tables below, together with the monthly average shade temperatures for the year under review.

Rainfall: Comparative Records for Six Years.

Months.	1914-15		1915-16		1916-17		1917-18		1918-19		1919-20	
	No. of days	Inches.	No. of days	Inches.	No. of days	Inches.	No. of days	Inches.	No. of days	Inches.	No. of days	Inches.
April	18	6·60	14	5·60	15	4·68	19	8·63	19	5·41	20	5·16
May	15	3·85	18	4·56	17	4·81	18	8·10	13	4·93	14	3·29
June	16	5·14	14	4·33	17	3·22	12	4·46	11	3·29	6	1·79
July	12	5·43	6	0·36	5	0·87	3	0·23	4	0·89	10	1·36
August	14	5·50	10	2·77	15	2·58	14	4·29	12	4·55	11	3·54
September ..	18	5·12	12	4·52	16	9·46	16	8·58	10	3·47	15	6·64
October	19	5·43	14	5·23	15	4·60	12	5·33	14	2·64	15	3·45
November	26	8·00	18	6·33	12	3·13	4	1·60	12	1·50	16	5·04
December	6	0·55	13	3·84	10	5·42	6	0·52	7	1·79	13	2·76
January	5	0·69	10	0·81	13	3·54	8	1·37	2	0·05	6	3·33
February	12	4·90	11	4·90	17	6·14	4	0·56	12	8·97	6	0·65
March	15	4·01	15	4·40	7	4·18	11	1·97	12	8·18	15	4·38
Totals ..	176	55·22	155	47·65	159	52·63	127	45·64	128	45·67	147	41·39

Monthly Average Shade Temperatures, 1919-20.

Months.	7 A.M.		2 P.M.		Maximum Temperature	Minimum Temperature	Highest Maximum Temperature	Lowest Minimum Temperature.
	Dry Bulb	Wet Bulb	Dry Bulb	Wet Bulb				
April	67·98	65·86	77·20	69·50	78·63	64·86	82·00	62·00
May	67·16	65·09	77·22	69·03	77·77	64·41	82·00	62·00
June	66·70	63·53	76·86	67·10	77·53	62·00	80·00	61·00
July	64·93	63·03	74·70	65·45	77·20	62·30	83·00	60·00
August	65·06	62·64	79·20	75·50	80·32	62·10	85·00	60·00
September ..	64·50	63·30	77·10	75·66	80·16	62·40	89·00	60·00
October	65·70	64·13	79·74	72·80	82·32	63·10	87·00	61·00
November	64·60	62·70	78·56	71·80	81·33	62·46	89·00	61·00
December	65·35	63·16	81·13	71·32	83·84	63·10	89·00	60·00
January	65·40	63·20	82·51	72·42	86·16	63·26	91·00	60·00
February	66·72	64·00	85·20	72·62	86·41	62·20	91·00	59·00
March	67·48	65·22	72·32	69·30	79·90	64·55	92·00	62·00

Distribution of Plants and Seeds.

4. The following were distributed during the year :—

	Plants.	Seeds.
Para	65,100 ...	32,000
Coffee	— ...	34 lbs.
Tea	3,550 ...	2,050
Fruit Trees, various	692 ...	—
Decorative	1,354 ...	1 packet.
Maize	— ...	460 lbs.

Of the above, 1,864 plants, 22 lbs. and one packet of seeds, were issued free to the Administrative Officers for planting in the various stations, Kampala receiving the largest portion.

Coffea arabica.

5. Most of the plots having been more or less severely pruned in the previous year, the trees received no special attention beyond the ordinary weeding and "handling". The coffee "bug" (*Antestia orbitalis, var. faceta*), was not much in evidence, but the crops were much below normal, due probably to unfavourable weather, and to the trees being rather exhausted by the constant effort to make up the growth lost by the severe pruning they have received of late. Comparative yields of five of the principal plots for the past six years are given in the tables below :—

No. of Plot.	Average Yield of Parchment Coffee per acre.						Remarks (Treatment).					
	Previous Records.					Present Record.	1913	1914	1915	1916	1917	1919
	1914-15	1915-16	1916-17	1917-18	1918-19							
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.						
1	363	300	819	20	504	121	Manured Basic Slag and Cow Manure.	—	Manured with Egyptian Phosphates.	—	All irregular trees stumped.	All irregular trees stumped.
2	82	130	598	59	204	70	—	—	60% of trees stumped.	—	do	—
3	91	176	445	6	445	98	—	—	—	—	do	—
4	231	730	94	—	264	114	—	Manured Cotton Seed 21 lbs per tree.	Manured Liquid Cow Manure.	Mulched Lemon Grass Stumped to 3'.	—	Severely pruned March, 1919.
5	212	437	762	—	195	181	—	—	—	—	do	—

NOTE :—Plots 1—3, 6′ × 8′, 9½ years old; 4—5, 8′ × 8′, 8 years.

The figures for plots 6 and 7 are not included, as they have borne no crop owing to the fact that they had all the primaries cut back to within four or five inches of the main stem in January, 1919.

It will be noticed that the yields have never been up to the average, as the ground in which the trees are planted is very poor and stony, and being on a steep slope, most of the good soil has been washed away.

"Leaf Disease" and "Die-back", though present, were not very prevalent. All the plots have flowered well and there are prospects of a good crop during the coming year.

The small plot of the "Bourbon" variety, half an acre in area, planted in April, 1916, yielded at the rate of 426 lbs. of "parchment" coffee per acre.

The coffee growing under Grevillea robusta shade, compares very favourably with similar coffee not shaded. It is hoped to give some comparative figures of the shaded and unshaded plots at a later date.

Coffea robusta.

6. Plot No. 1 continues to hold the lead as regards yield, and though this is larger than the previous year, it is a long way behind those of the first two years. Plot 2 continues to give but poor yields, and plot 3 is little better, which points to the necessity of obtaining robusta seed from reliable sources, if good results are to be obtained. There is nothing special to report in the way of pests and diseases,

growth having been good and healthy. The yields for the last four years are given below:—

No. of Plot	Origin.	Area.	Date Planted.	Average Yield of Parchment. Per acre. 1916-17	1917-18	1918-19	1919-20	Per tree. 1916-17	1917-18	1918-19	1919-20	Distance planted apart.
		Acres.						lbs.	lbs.	oz.	oz.	
1	Toro or Congo	0·62	March, 1914	604	1,359	258	333	2	4·5	13·68	17·68	12 feet by 12 feet.
2	Local ..	1·00	Sept, 1914	—	160	20	31	—	·69	1·3	2·05	Half area 12 feet by 12 feet, remainder 15 feet by 15 feet.
3	Bwamba Forest	0·5	May, 1915	—	614	102	81	—	1·92	5·1	4·05	12 feet by 12 feet.

The trees are planted rather too far apart, 10 feet by 10 feet would appear to be a better distance, and this has been used for most of the later plantings. Some allowance should be made for this when comparing the yields with those of C. arabica.

The small plots, the progeny of selected trees of plot No. 1, which were planted out in March and April, 1918, have made good growth and have flowered well.

Small quantities of coffee have been picked from the Mukono, Bwebza, Canephora, Quilou, and Mubendi types of C. robusta. Records are being kept, and the cultivation of any that prove promising will be extended.

Coffea excelsa.

7. The yields of these trees continue to be very low. The yield of plot No. 1 has fallen off considerably, that of plot 2 has not increased to any appreciable extent; but there is a distinct improvement in plot 3. A few of the best yielding trees have been selected, and their yields are being kept separate, with a view to obtaining information as to which are the most suitable for propagation. Particulars of the yields, etc., are given below:—

No. of Plot.	Area.	Date planted.	Distance apart.	Yield of "Parchment" Coffee. Per acre. 1918-19	1919-20	Per tree. 1918-19	1919-20
	acres.			lbs.	lbs.	ozs.	ozs.
1	1	Sept, 1915	15 feet x 15 feet	90	22	7·39	1·8
2	0·62	do	do	42	44	3·47	3·66
3	0·33	do	do	12	70	1·00	5·66

Coffea liberica.

8. These trees are very similar in growth and habit to C. excelsa, and like them, up to now, they are poor yielders. The 40 trees planted in March, 1916, have yielded 2 lbs. up to March, 1920, or, ·8 ozs. per tree.

Para Rubber.

9. The tapping experiments have been continued, and the results are given in the two tables on pages 17 and 18. The increase in the yields shown during the year 1918-19 has not been maintained in all the series, but, apart from unfavourable weather, there are two reasons for this, one being that the trees were rested for one month from the 22nd February to the 21st March inclusive, and the other that, with three exceptions, the height of the tapping area was two or three feet from the ground. This latter has a considerable influence on the yields, as, generally speaking, the nearer the tapping cut is to the base of the tree, the better the yield, and this is supported by the fact that in each series where the cut was near the base of the tree, there was an increased yield over the previous year, in spite of the month's rest which the trees received, the series concerned being Nos. 4, 12, and 10.

The number of non-yielding trees has increased in some series, and there is no doubt that the trees are still feeling the effects of the unfavourable weather of the last two or three years; another factor is the changing of the tapping cut from the base of the tree to two or three feet high, when the basal tapping area is finished. Also some trees are notably poor yielders, and our records show that it is the same trees which continue to go dry, some having been dry through most of the tapping

Para Rubber—Tapping Experiments—I.

No. of Series	No. of Trees in Series	Present girth at 3 feet	System of Tapping	Number of Parings			Total Yield of Rubber			Average Yield per Tree			Area of Bark Excised			Average No. of Parings per inch			Average No. for Year of non-yielding trees			Remarks
				1917-18	1918-19	1919-20	1917-18	1918-19	1919-20	1917-18	1918-19	1919-20	1917-18	1918-19	1919-20	1917-18	1918-19	1919-20	1917-18	1918-19	1919-20	
		inches					lbs. oz.	lbs. oz.	lbs. oz.	oz.	oz.	oz.	inches.	inches.	inches.							
1	24*	29·6	V. ½ surface alternate days	146	154	138	20 2	25 0	17 4	13	16	11·50	7·7	9·3	7·85	18·9	16·56	17·59	1·18	2·26	4·16	Height of 1919-20 tapping area 3 feet
2	25	28·6	V. ½ surface alternate days	147	155	138	15 2	16 0	16 0	9·06	10·24	10·24	7·9	7·1	9·22	18·6	21·83	14·96	·40	2·55	2·45	Height of 1919-20 tapping area 2 feet
3	23*	29·2	1 cut ½ surface alternate days	147	155	141	22 15	28 14	23 8	14·7	18·05	16·34	8·2	9·8	9·68	18·0	15·81	14·57	·88	1·44	·66	Height of 1919-20 tapping area 2 feet
4	22*	29·5	1 cut ½ surface alternate days, changed half yearly	152	150	143	21 12	24 12	25 12	13·9	15·84	18·72	9·4	5·6	6·17	16·17	23·25	21·57	·59	1·52	·61	Height of 1919-20 tapping area 6 inches
11	50	26·7	1 cut ½ surface alternate days	137	155	143	31 10	37 14	35 0	10·1	12·12	11·20	8·2	10·8	9·18	16·7	14·35	15·58	2·35	1·32	2·70	Height of 1919-20 tapping area 3 feet
12	50	28·1	1 cut ½ surface alternate days	150	142	145	35 12	40 15	49 7	11·4	13·1	15·68	9·7	8·3	9·14	15·4	17·10	15·86	1·39	1·02	2·41	Height of 1919-20 tapping area 6 inches
13	50	26·4	1 cut ½ surface daily	233	307	284	50 13	55 10	39 11	16·0	17·08	12·70	12·1	15·9	15·39	15·6	20·00	18·45	2·56	3·07	2·41	Height of 1919-20 tapping area 3½ feet
5	25	28·7	2 cuts ¼ surface alternate days	147	156	143	23 14	23 0	19 8	15·3	14·72	12·48	9·0	10·0	9·40	16·3	15·60	15·00	·70	1·42	·50	Height of 1919-20 tapping area 2½ feet
6	25	29·4	2 cuts ¼ surface alternate days, changed half yearly	151	152	143	22 5	23 0	18 13	14·03	14·72	12·04	10·3	10·7	8·19	14·6	14·29	17·46	1·18	·73	4·00	Height of 1919-20 tapping area 2½ feet
7	25	27·64	1 cut ⅓ surface alternate days	147	156	139	16 2	16 8	24 0	10·03	10·56	15·36	9·4	7·6	9·23	15·6	20·52	15·06	1·00	·97	1·75	Height of 1919-20 tapping area 2 feet
8	24*	28·9	1 cut ⅓ surface alternate days, changed half yearly	151	152	140	16 3	17 6	25 12	10·03	11·12	17·16	9·8	9·2	8·45	15·4	16·53	16·56	·77	·342	5·00	Height of 1919-20 tapping area 2 feet
9	50	27·3	1 cut ⅓ surface alternate days	137	153	143	16 2	22 6	26 6	5·16	7·16	8·44	9·4	7·6	8·52	14·5	20·13	16·78	2·21	3·41	·75	Height of 1919-20 tapping area 2½ feet
10	50	27·9	1 cut ⅓ surface alternate days, changed half yearly	140	152	145	19 0	30 15	33 5	6·0	9·9	10·66	7·4	6·6	7·40	18·9	23·03	19·59	1·59	1·9	5·7	Height of 1919-20 tapping area 6 inches
14	50	27·4	1 cut ⅓ surface daily	231	310	284	38 8	60 10	33 8	12·03	19·04	10·72	12·8	17·2	17·0	18·8	18·02	16·70	3·00	2·27	4·66	Height of 1919-20 tapping area 3 feet
15	50	30·7	1 cut ⅓ surface daily	106	310	284	10 6	44 8	45 13	12·1	14·28	14·66	6·0	19·0	17·0	17·6	16·31	16·70	6·68	4·55	4·50	Height of 1919-20 tapping area 2½ feet

* These series had 25 trees previously to April, 1919, the others have been broken by storms.

NOTE:—All series were rested for one month, from 22nd February to 21st March, 1920, inclusive.

Para Rubber—Tapping Experiments—II.

No. of Series.	Tapping Period.	Total number of Parings.	Biscuit Rubber.	Scrap Rubber.	Total Rubber.	Average Yield per Tree.	Average Area of Bark Excised.	Average No. of Parings per inch.	Average No of Trees not Yielding.
			lbs. ozs.	lbs. ozs.	lbs. ozs.	Ounces.	Inches.		
1	20th April, 1917, to 31st March, 1920	438	51 1	11 5	62 6	40·50	24·85	17·62	2·53
2	„ „ „	440	37 14	9 4	47 2	30·16	24·22	18·16	1·80
3	„ „ „	443	65 15	9 6	75 5	49·09	27·68	16·00	·98
4	„ „ „	445	64 10	7 10	72 4	48·46	21·17	21·02	·90
11	15th May, 1917, to 31st March, 1920	435	96 7	8 1	104 8	33·44	28·18	15·47	2·12
12	„ „ „	437	118 7	7 11	126 2	40·36	27·14	16·10	1·60
13	26th May, 1917, to 31st March, 1920	824	137 5	8 13	146 2	46·76	43·39	19·00	2·68
5	23rd April, 1917, to 31st March, 1920	446	57 5	9 1	66 6	42·50	28·40	15·70	·87
6	„ „ „	446	55 2	9 0	64 2	41·04	29·19	15·27	1·97
7	„ „ „	442	48 1	8 9	56 10	36·24	26·23	16·85	1·24
8	„ „ „	443	51 14	7 7	59 5	38·31	27·45	16·14	2·03
9	15th May, 1917, to 31st March, 1920	433	58 3	6 11	64 14	20·76	25·52	16·96	2·12
10	„ „ „	437	76 9	6 11	83 4	27·04	21·40	20·42	3·06
14	26th May, 1917, to 31st March, 1920	825	124 5	8 5	132 10	42·44	47·00	17·55	3·31
15	19th December, 1917, to 31st March, 1920	700	93 6	7 5	100 11	32·22	42·00	16·61	4·50

NOTE:—The trees were planted in 1910. All series were rested for one month—from 22nd February to 21st March, 1920.

period. These latter will be cut out at a later date. Coming to the different systems of tapping, obviously the most satisfactory one to date, is the 1 cut on ½ surface on alternate days, as shown in series 3 and 4, which average a yield of just over 3 lbs. of dry rubber for the three years. If we take series 3, 4, 11, and 12 (½ cuts on alternate days) and compare them again with series 7, 8, 9, and 10 (⅓ cuts on alternate days), taking the average per tree for the three years, we find a difference in the yields in favour of the former of 12·85, 10·15, 12·68, and 13·32 ozs. respectively, showing that the system of ½ cuts continues to hold its own, though it must be admitted that the ⅓ uses up less bark and, as will be seen, the average yields per year show a continued gradual increase, even during the last year, which tends to show that this system may be less exhausting to the trees.

Taking the daily tapping of these two systems, we find a distinct falling off in the yields of both (series 15, which was not included in last year's figures, need not be considered here, as it was originally started with the object of testing the resistance to "Bark Rot" infection by tapping at 3 feet from the ground), but for the three years there is only 4·32 ozs. per tree in favour of the ½ cut. Daily tapping uses up the bark too quickly, and is not to be recommended, but, of the two, the ⅓ cut is to be preferred, as being less exhaustive, and judging by the results so far obtained, giving almost as good a yield.

There seems little to be said in favour of the "change over" systems, rather the reverse, as there is no increase in yields, and both sides of the tree have to be tapped the same year. Of the other systems, the V on ½ surface and the 2 cuts on ¼ have given fair yields, but are not so satisfactory as the ½ cut.

As regards the paring, there is no improvement, but, on the whole, last year's standard has been maintained.

Bark renewal has been good, and though there have been some cases of "Bark-rot," this disease does not appear to be on the increase, and the general health and condition of the trees is very satisfactory.

Tea.

10. The old plots continue to do well. A lot of seed was obtained from plot 1, 2,050 being distributed and the remainder being sown in the nurseries, from which 3,550 plants were distributed, and a large number obtained for filling up vacancies in plots 3 and 4. Unless planted out in very favourable weather, and shaded, the plants are difficult to establish, but when this is once accomplished, they grow away vigorously. In spite of frequent attention, there still remain many vacancies in plots 3 and 4, but plenty of seedlings are available and will be planted out during the coming year. One half of plot 2, total area ½ acre, planted in 1911, was severely pruned in March, 1919, and very little leaf was plucked from this half during the year. Records of the weight of leaf plucked have not been kept, but the amount of prepared tea for the year was 68½ lbs.

Some of the older established bushes in plot 3 have been pruned and from these 9¾ lbs. of prepared tea were obtained.

The tea prepared on the plantation, though manufactured in the most simple manner, no machinery of any sort being available, obtains a ready sale, mostly to natives, at one rupee a pound. Diseases and pests have so far given little trouble.

Cacao.

11. The yields of the numbered trees of the Forastero type are included once more, but it will be seen that the average yield is smaller than it was in 1917-18. A number of trees having died, they are no longer included. As only two numbered trees of the Calabacillo type yielded, one yellow and one red, figures for these are not given. Many of the numbered trees have not maintained their vigour and have proved poor yielders, not even equalling the average for the whole of the trees, and it will be advisable to drop some of them. On the other hand some of the unnumbered trees are giving good crops, and records of some of these might be kept with advantage. The total number of trees now established in the old cacao area is 1,037, the total number of pods picked during the year being 20,642, or an average of 20 pods per tree. The amount of dry, fermented

cacao obtained was 827 lbs., or, ·60 lbs. per tree. It will be seen that the number of pods necessary to produce 1 lb. of prepared cacao is very high, being aproximately 25. This is probably due to the large number attacked by "mosquito blight" (*Helopeltis bergrothii, Reut. var.*), which checks their development and makes them small and stunted.

Cacao Yields.

9½ Years. **Theobroma Cacao Forastero.** 13 feet x 13 feet.

Red Variety.								Yellow Variety.							
No. of Tree.	Previous Records.					Present Record.	Total Yield for 6 years.	No. of Tree.	Previous Records.					Present Record.	Total Yield for 6 years.
	1913-14	1914-15	1915-16	1916-17	1917-18				1913-14	1914-15	1915-16	1916-17	1917-18		
10	8	9	16	5	10	1	49	1	12	53	44	44	25	—	178
16	8	4	26	16	87	51	192	3	28	64	91	30	35	4	252
21	11	17	25	61	55	3	172	9	19	10	39	46	151	32	297
22	11	61	37	56	12	57	234	18	2	12	25	14	5	76	134
24	9	7	58	—	—	19	93	19	3	44	36	95	131	23	332
26	6	8	4	14	11	25	68	23	3	30	122	99	151	80	485
27	4	12	52	41	3	7	119	25	9	17	57	5	90	3	181
29	11	44	97	70	40	16	278	28	4	73	110	58	43	6	294
31	9	28	46	31	26	15	155	30	9	31	13	3	5	116	177
32	2	55	95	47	63	89	351	39	1	3	61	15	7	13	100
35	8	26	22	7	20	127	210	45	8	87	114	67	25	13	314
36	11	12	28	26	88	77	242	49	6	2	51	11	70	26	166
37	4	3	36	28	32	12	115	52	11	29	34	17	20	35	146
38	7	64	30	90	50	9	250	53	14	13	77	22	46	1	173
40	1	27	33	37	20	3	121	54	3	12	34	5	1	3	58
44	2	8	11	4	—	20	45	58	3	1	41	14	28	6	96
48	7	44	53	53	65	14	236	61	4	22	44	39	52	16	177
55	1	28	84	29	49	5	196	68	10	5	84	24	49	12	184
56	4	3	10	48	19	—	84	70	3	22	11	6	7	4	56
60	4	5	32	7	19	13	80	76	16	—	49	9	7	1	82
71	5	5	74	65	102	17	268	79	3	15	19	10	13	—	60
72	8	76	54	75	98	61	372	82	46	94	57	5	78	48	328
74	15	22	67	33	47	20	204	—	—	—	—	—	—	—	—
75	24	21	53	116	123	155	492	—	—	—	—	—	—	—	—
Total 24	180	589	1043	959	1039	816	4626	22	223	639	1213	638	1039	518	4270
1913-14*	7·5								10·13						
1914-15		24·54								29·04					
1915-16			43·45								55·13				
1916-17				39·95								29·00			
1917-18					43·29								47·23		
1919-20						34·00								23·54	

* Yield for 9 months only.

NOTE:—No records for 1918-19.

The younger plots of cacao are not yet in full bearing, but particulars are as follows:—

No. of Plot.	Variety.	Date Planted.	Distance.	Shade.	No. of Trees.	Total Pods.	Av. Pods per tree
1	Calabacillo Red ...	March, 1914	15′ × 15′	Caesalpinia dasyrachis	61	209	3·42
2	Forastero Red ...	July, 1914	ditto	"Rain Tree" ...	85	189	2·22
3	ditto ...	Oct., 1914	ditto	ditto ...	90	59	·63
4	Forastero Yellow ...	Nov., 1914	ditto	ditto ...	96	233	2·42

There is nothing new to report with regard to pests and diseases. Most of the common ones have been present, but the damage done has not been above the average. It has not been found possible to carry out may remedial measures during the year under review, but it is hoped to eliminate the weaker trees and then concentrate on the remainder with a view to producing a type of cacao suitable for this country.

Sugar Cane.

12. The interest in this crop continues to be maintained, and 3,484 canes were issued to Planters as sets during the year. The table on page 21 shows some of the more important varieties grown, and the number and weight of canes cut during the year, but is not intended to show the yield per acre, as the canes were only cut for sale to natives or as sets, and not for crushing.

Samples of some varieties were crushed by Mr. Allidina Visram, at Entebbe, and details are given, though unfortunately the cane was cut a week before being crushed, so that the figures are given with some reserve and only on account of the demand for information on the subject. At the time of writing we have received a small crushing mill of our own, and when this is set up we shall be in a position to give more reliable information.

Variety.	Area.	No. of Canes cut 1919-20.	Weight.	Quantity crushed.	Weight of Megass.	Juice.	Weight of Jaggery.
	Acres.		lbs.	lbs.	lbs.	gall.	lbs.
Barbados Purple (Striped Tanna) ...	0·45	2,008	17,103	400	160	20¼	38 (dry)
Barbados Yellow	0·30	2,676	7,580	400	156	20½	45 (moist)
White Tanna	0·45	784	3,226	400	154	20¼	46 (dry)
No. B. 4596	1·10	2,952	10,259	400	157	19½	47 (moist)
No. B. 3922	0·50	2,844	12,356	200	81	10	17 (dry)
No. D. 74	0·10	622	1,812	180	74	7½	19½ (dry)
Sealey's Seedling	0·50	2,753	8,283	...	...	...	...
Miscellaneons	1·60	9,599	30,671	..	...	...	...
TOTAL ...	5·00	24,238	91,290	...	...	...	...

Sweet Potatoes (*Batatas edulis*).

13. The ⅛ acre plots planted in April were harvested in November, particulars of the results and yield of dry starch obtained are given below; for further particulars with regard to the habit, etc., of the plants, reference should be made to the annual report on this plantation for the year ended March 31st, 1919.

The plots were replanted again in November with the same varieties, with a view to obtaining information as to what effect this exhausting crop has upon the soil. Particulars of the yields of this planting are not yet available. Another five varieties were planted out in December.

Sweet Potato (*Batatas edulis*).

Variety Number.	Native Name.	Date Planted.	Date Harvested.	Yield per acre.	Yield of Dry Starch per 100 lbs. fresh tuber.	Weight of dry Residue.
				tons.	lbs. oz.	lbs. oz.
1	Magabali ...	April, 1919 ...	Nov., 1919 ...	3·61	7 4	14 0
2	Kiwoko ...	do ...	do ...	3·35	6 3	15 0
3	Kifeje ...	do ...	do ...	5·85	4 6	15 0
4	Ngelozachwa ...	do ...	do ...	4·39	5 0	14 0
5	Munyobya ...	do ...	do ...	6·5	5 0	15 6
6	Mugowa ...	do ..	do ...	4·39	5 0	16 0
7	Nakamogoli ...	do ...	do ...	1·9	5 0	20 0
8	Nakitembe ...	do ...	do ...	3·81	4 6	13 0
11	Nsenjebekere ...	do ...	do ...	4·9	4 0	20 0
12	Buwala ...	do ...	do ...	5·33	6 0	17 4

Wheat.

14. Sowings were made in February and August of Pusa varieties Nos. 4, 6, and 12. The first sowing did well but the second was a failure. A number of new varieties from British East Africa were sown in September. Though "rust-resistant" they were all attacked by this disease, especially No. 11. Particulars, as far as available, are given below. Further trials are being made.

Variety.	Area Sown.	Quantity Sown.	Date of Sowing.	Date Harvested.	Total Yield.	Yield per acre.
	Acres.	lbs.			lbs.	lbs.
No. 4	0·10	10	February	June	63	630
No. 6	0·10	10	,,	,,	32	320
No. 12	0·10	10	,,	,,	76	760
Cross 1019	...	5	3-9-19	December	15	...
Indian 17	...	5	,,	,,	18	...
Cross 11	...	5	,,	,,	23	...
Cross 1017	...	5	11-9-19	,,	1½	...
Cross 14	...	5	,,	,,	28	...
Cross 13	...	5	,,	,,	3	...

Fruit and Economic Plants.

15. A list, together with a few notes, of the various fruit and other economic plants of interest, which are cultivated on the plantation, is given below. These are grown chiefly in order to obtain seeds and plants for distribution.

Name.	Common Name.	Remarks.
Achras sapota ...	Sapodilla Plum ...	1 tree, flowered, not fruited. A cool, luscious and agreeable fruit when thoroughly ripe.
Anacardium occidentale ...	Cashew Nut ...	1 tree, fruited, edible fleshy peduncle, and seed.
Anona muricata ...	Sour Sop ...	Several trees, fruited. Sweet juicy pulp surrounding seeds.
Anona squamosa ...	Sugar Apple ...	Several trees, fruited. Sweet custard-like pulp.
Areca Catechu ...	Areca Nut Palm ...	Two plots, fruited. Seeds used as a masticatory.
Artocarpus integrifolia ...	Jack Fruit ...	One tree, fruited. Edible pulp and seeds.
Carica Papaya ...	Papaw ...	Several varieties, fruited. Useful as fruit or vegetable.
Cinnamomum camphora ...	Camphor ...	One tree, still small.
Citrus aurantium ...	Orange ...	Seedlings and var. Washington Navel, fruited.
C. medica, var. Limonum ...	Lemon ...	Variety Lisbon. Several trees fruited.
C. decumana var. ...	Grape Fruit ...	Several seedlings, not good flavour, rather bitter.
C. nobilis ...	Mandarin Orange ...	Several seedlings, fruited.
Cresentia Cujete ...	Tree Calabash ..	One tree, flowered, not fruited, shell of fruit polished and used for ornament.
Chrysobalanus Icaco ...	Coco Plum ...	Several bushes, fruited. Rather acid plum-shaped fruit, useful for preserves.
Eriobotrya japonica ...	Loquat ...	One tree, fruited. Rather acid, suitable for stewing.
Erythroxylon Coca ...	Coca or Cocaine ...	One small plot. Cocaine extracted from the leaves.
Eugenia Jambos ...	Rose Apple ...	Several trees fruited. Acid fruit, sometimes used in preserves.
Mammea americana ...	Mammee Apple ...	Several trees, flowered, not fruited. Nearly spherical fruit with sweetish pulp which may be eaten raw or preserved with sugar.
Mangifera indica ...	Mango ...	Two trees, fruited.
Morus nigra var. ...	Mulberry ...	One small plot, fruited. Very useful for stewing or preserves.
Persea gratissima ...	Avocado Pear . .	One large tree, several seedlings, not yet fruited. Pulp of fruit used as salad, either plain or flavoured with salt, pepper and vinegar.
Phoenix dactylifera ...	Date Palm ...	One plant, still small.
Psidium cattleanum ...	Cherry Guava ...	Several trees, fruited. Fruit useful for tarts, preserves or jelly.
Punica granatum ...	Pomegranate ...	Several trees, fruited. Fruit rather poor, very little pulp surrounding seeds.
Vanilla planifolia ...	Vanilla ...	Forty young plants. Pods provide the well known spice.

Miscellaneous Crops.

16. Attention is being given to various native food crops. A collection of native bananas is being made, 34 varieties being planted between August and November. Experiments are also being carried out with Cassava, 8 varieties of which were planted in December. Two varieties of *Colocasia antiquorum* (Coco Yam) have also been planted in addition to maize and millet, which are grown for seed distribution.

Various annual crops are grown, mostly as catch crops, so that reliable records are not kept. These include Soya beans, in 5 varieties, Bush Lima, Haricot and Native beans, Garden Pea (Mauritius strain), Pachyrhyzus tuberosus, etc.

A small plot, $\frac{1}{3}$ acre in area, was sown with $13\frac{1}{2}$ lbs. of Flax seed on the 7th September. This was left for seed, but the yield was not very high, being $92\frac{1}{2}$ lbs., or $276\frac{1}{2}$ lbs. per acre. It was pulled in January, or four months from sowing. Further experiments are being made with this crop and it is hoped to obtain better results, also some information as to retting and the quality of the fibre.

J. D. SNOWDEN,

District Agricultural Officer.

ANNUAL REPORT

ON THE

BOTANIC GARDENS, ENTEBBE.

The writer took over his duties at the Botanic Gardens in February, 1920. This report is, therefore, to a great extent necessarily based on statistics and records compiled by the previous Curator.

Rainfall.

As will be seen from the data given in the table below, Entebbe was favoured throughout the year with a fairly regular rainfall.

December and February were trying months in which the Gardens suffered from lack of rain ; the latter month especially, when rain fell on two occasions only.

Full meteorological details are given in Appendix No. 18.

Rainfall for last Five Years.

Months.	1915-16.		1916-17.		1917-18.		1918-19.		1919-20.	
	No. of days rain fell.	Inches.	No. of days rain fell.	Inches.	No. of days rain fell.	Inches.	No. of days rain fell.	Inches.	No. of days rain fell.	Inches.
April	17	10·30	15	5·92	23	13·30	23	10·88	19	4·84
May	24	7·85	11	3·96	19	9·90	11	9·05	17	10·52
June	13	6·84	15	9·78	7	2·85	18	5·17	11	5·97
July	6	2·88	7	3·16	1	·02	7	1·89	16	7·72
August	6	1·68	12	4·53	13	1·50	10	1·75	11	2·70
September	12	5·22	12	4·44	12	5·32	9	3·21	11	3·09
October	10	5·38	7	3·04	10	5·56	7	3·05	15	3·55
November	14	4·45	9	3·50	6	2·71	15	4·84	9	2·97
December	13	9·42	8	3·68	6	1·06	13	2·41	6	1·53
January	8	·74	8	2·86	10	2·07	7	1·45	7	2·42
February	12	5·95	14	8·31	7	1·07	17	7·06	2	1·36
March	11	5·63	3	2·19	15	3·59	17	9·00	14	4·12
Total	146	67·34	121	55·37	129	48·95	154	59·76	138	50·79

Labour.

Labour presented no difficulties, the supply being ample. The average number employed was 79, and the average wages Rs. 8/- per month for regular employees, and Rs. 5/- per month for Kasanvu labourers.

About 50% of the labour was composed of Kasanvu labourers.

Nursery.

A large stock of both economic and decorative plants was maintained throughout the year.

The raising and distribution of plants rank probably as the most valuable work undertaken here.

The following are particulars of the distribution of plants and seeds for the year :—

PLANTS.			SEEDS.		
Economic.		Decorative.	Economic.		Decorative.
Various.	Para Rubber.		Packets Various	Para Rubber.	105 Packets
3,511	8,000	2,752	81	165,400	110 Single seeds.

New Introductions.

Many new plants have been added to the collection during the year. A list of the more important of these is given below. In most cases the plants are still small, and it is not yet possible to form an opinion as to whether their cultivation in this country will be successful.

For these introductions, thanks are due to the heads of several Botanic Stations for kindly supplying the seeds from which the plants were raised. In this connection, mention may be especially made of the following :—

Lady Hanbury, La Mortola, Italy.
Director of Agriculture, Giza, Egypt.
Director of Experimental Farms, Ottawa, Canada.
Superintendent, Royal Botanic Gardens, Peradeniya, Ceylon.
Director of Agriculture, Buitenzorg, Java.
Director, Brooklyn Botanic Gardens, U. S. A.

List of New Introductions.

* Acacia Senegal
* Aloe candelabrum
* A. transvaalensis
* A. saponaria
* A. longibracteata
* A. macracantha
* A. Greadheadii
* A. Hanburyana
Achillea ptarmica
Aquilegia blanda
A. Kitaibelii
* Aberia Caffra
* A. Gardneri
Acacia saligna
Allamanda Hendersonii
Burchellia capensis
Bignonia Tweediana
Bauhinia grandiflora
Calendula stellata
Callistemon lanceolatus
* Ceratonia siliqua
* Cinchona officinalis
Clematis sp.
Clitoria Ternatea
* Calotropis gigantea
Chrysanthemum frutescens
* Diospyros Lotus
* Durio zibethinus
Digitalis viridiflora
* Ephorbia geniculata
Erythrina crista-galli
Eryngium amethystinum
E. rigidum
* Furcraea altissima
* F. depauperata
* Garcinia mangostana
* Hibiscus Moscheutos
Inula grandiflora
Lathyrus tingitanus
* Moringa pterygosperma
Opuntia elongata
* Phenix dactylifera
* Palaquium borneense
* P. Gutta
* P. javanse
* P. calophyllum
* Treubii
* Prosopis juliflora
Pithecolobium dulce
Phytolacca diocica
Robinia pseudacacia
* Vangueria edulis
Verbascum Thapsus

* Plants of economic value.

Lawns and Flower Beds.

The lawns have been maintained at their usual high standard. Portions have from time to time been dug up and replanted, but on the whole the turf has remained in excellent condition.

Many of the new introductions have been planted out in suitable places on the lawns or in the flower beds, and it is hoped that a fair percentage may be successfully established.

Exotic plants have a very trying time after being planted out. Even if planted at the commencement of the rains, they do not have time to become well established before the dry weather sets in. During this time also, they are often the prey of innumerable insect pests and fungoid diseases, and require much care to tide them over this period. Many exotics, when once they are established, grow vigorously in Uganda. On the other hand, there are many which are unable to adapt themselves to their changed environment.

Some of the flower beds which were not satisfactory were replanted with more suitable subjects. On the whole, however, they were maintained as in the previous year, and proved very attractive. The beds of Roses, Chrysanthemums and Cannas were particularly good, being in flower practically the whole of the year.

Other beds which proved very successful were of *Bougainvillea speciosa*, *Salvia farinacea*, *Plumbago capensis*, *Clerodendron capitatum*, *Lantana sp.* and *Ipomoea Hildebrandtii*.

Trees in Flower and Fruit.

Mention has been made in previous reports of many of the best of our indigenous trees. Other trees which are worthy of note are as follows :—

"Mvule" (*Chlorophora excelsa*, Benth, and Hook), a fine lofty tree belonging to the Order *Moraceae*. There is one splendid specimen in the Gardens, with a fine straight trunk rising unbranched to a height of about 60 ft., and 12 ft. in circumferance at the base. The timber is very valuable as it resists the attacks of white ants.

"Kirundu" (*Antiaris Welwitschii* Engl. syn. *Ipo toxicaria*, Hiern). This tree also belongs to the *Moraceae*. There are several examples in the Gardens. It is a lofty tree growing to a height of 50-60 ft., usually unbranched for about 40 ft., and with a spreading crown. The fruits are soft and velvety, and bright scarlet when fresh.

Another interesting Moraceous tree from a decorative point of view is *Masanga Smithii*, R. B. R., of which there are several specimens growing in or near the Fernery. The trunk is comparatively slender and unbranched to about 20 ft. The branches are spreading, and the leaves large and divided almost to the midrib into many segments ; the segments radiating after the manner of the common horse-chestnut.

Of exotic trees the following may be mentioned :—

The "Moreton Bay Chestnut" (*Castanospermum australe*, A. Cunn). There are two of these in the Gardens, handsome shapely trees, and they flowered for the first recorded time in October. Unfortunately they failed to set any seed.

Cola Nut (*Cola acuminata*, R. B. R.)

Originally these trees, six in number, were planted on the higher part of the lawn. Finding them not quite happy in this situation, Mr. Maitland in 1917 had them transplanted to a lower part of the Gardens, where they would have the benefit of moister conditions. Since transplanting the plants have made excellent progress and have flowered several times. Until the year under review, however, they failed to set fruit, but at the time of writing there is a fine fruit (noty et ripe) on one of the trees, so we may hope for more in future years.

Cacao (Theobroma cacao).

The yields of pods from the two plots of cacoa have been recorded and the results are tabulated below.

It will be observed that the yields, in comparison with those of the previous year show a very decided decrease. This is almost entirely due to the ravages of the scale insect (*Stictococcus diversiseta*, Silv.), which so damages the young pods that they never have a chance to develop.

Various methods have been tried in an endeavour to exterminate this pest, but with no great success up to the present.

A considerable loss in yield must also be attributed to the squirrels which inhabit the Gardens. These animals bite a hole in the ripe or almost ripe pods and extract the beans.

Cacao Yields.

Plot No. 1. Planted 1901.

CALABACILLO.										FORASTERO.									
Red Variety.					Yellow Variety.					Red Variety.					Yellow Variety.				
Number of Pods.					Number of Pods.					Number of Pods.					Number of Pods.				
Number of Tree.	1917-18.	1918-19	1919-20.	Total to Date.	No. of Tree.	1917-18.	1918-19.	1919-20.	Total to Date.	No. of Tree.	1917-18	1918-19	1919-20	Total to Date.	No. of Tree.	1917-18	1918-19	1919-20	Total to Date.
8	54	21	48	123	4	266	215	172	653	1	68	67	69	204	2	129	225	112	466
9	124	75	141	340	7	262	369	166	797	3	104	69	151	324	11	2	7	7	16
12	7	36	33	76	10	57	42	65	164	17	16	108	10	134	16	68	56	22	146
13	75	66	90	231	14	85	144	66	295	20	142	184	29	355	19	54	21	36	111
28	5	1	7	13	22	312	172	199	683	21	114	133	59	306	27	18	91	24	133
30	56	233	49	338	24	121	54	75	250	23	42	92	2	136	60	8	29	1	38
32	54	77	79	210	29	3	10	23	36	18	206	128	126	460	90	—	19	7	26
33	26	32	3	61	31	32	87	19	138	36	54	30	10	94					
39	22	31	21	74	35	65	43	24	132	44	4	16	12	32					
40	27	26	...	53	37	25	44	8	77	79	41	24	20	85					
42	72	208	22	302	64	23	20	11	54										
74	1	3	3	7	85	65	255	119	439										
76	19	24	26	69															
80	57	118	71	246															
82	82	136	164	382															
87	9	16	...	25															
Totals 16	690	1,103	757	2,550	12	1,316	1,455	947	3,718	10	791	851	488	2130	7	279	448	209	936
Averages per Tree 1917-18	43·1					109·6					79·1					39·8			
1918-19		68·9					121·2					85·1					64		
1919-20			47·3					78·9					48·8					29·8	

Plot No. 2. Later Plantings.

CALABACILLO.										FORASTERO.									
Red Variety.					Yellow Variety.					Red Variety.					Yellow Variety,				
Number of Pods.					Number of Pods.					Number of Pods.					Number of Pods.				
Number of Tree.	1917-18.	1918-19.	1919-20.	Total to Date.	No. of Tree.	1917-18.	1918-19.	1919-20.	Total to Date.	No. of Tree.	1917-18.	1918-19.	1919-20.	Total to Date.	No. of Tree.	1917-18.	1918-19.	1919-20.	Total to Date.
49	31	10	4	45	43	110	33	8	151	41	58	18	...	76	34	44	35	18	97
52	34	157	2	193	48	21	23	...	44	50	75	120	2	197	46	82	65	22	169
55	10	77	12	99	51	6	65	...	71	53	149	52	...	201	47	50	26	...	76
63	11	26	...	37	56	57	17	2	76	66	14	15	6	35	57	26	17	2	45
65	23	69	4	96	67	96	68	104	268	72	64	132	58	254	58	33	31	...	64
69	15	16	33	64	68	54	55	15	124	73	35	32	...	67	61	41	12	9	62
70	26	11	3	40															
71	10	29	9	48															
84	37	64	...	101															
Totals 9	197	459	67	723	6	344	261	129	734	6	395	369	66	830	6	276	186	51	513
Averages per Tree 1917-18	21·9					57·3					65·8					46			
1918-19		51					43·4					61·5					31		
1919-20			7·4					21·5					11					8·5	

Para Rubber Tapping.

The record tabulated on page 27 for the year 1919-1920 are from April, 1919, to March, 1920, inclusive, with the exceptions of Series 6 and 6A. The records given for the two series mentioned are from June 2nd, 1919, to March 31st, 1920.

Series 6 (2 cuts on ¼ surface daily) originally consisted of 100 trees. In order to demonstrate the advantage or disadvantage of the single over the double cuts, or *vice versa*, the series was divided into two series of 50 trees each, thus constituting Series 6 (2 cuts on ¼ surface daily) and Series 6A (1 cut on ¼ surface daily).

The yields, 245 lbs. and 203 lbs. respectively, appear at first glance to the advantage of the double cut, but against this advantage in yield must be weighed the undoubted disadvantage of using up double the amount of bark as compared with the

Progressive and Comparative Records.

No. of Series.	No. of Trees in Series.	Date Planted.	System of Tapping.	Date Tapping Commenced.	1917-1918.			1918-1919.				1919-1920.								Total No. of Times Tapped to Date.	Average total Area of Bark Excised to Date.	Average No. of Parings per inch.
					No. of Times Tapped.	Total Yield.	Average Yield per Tree.	No. of Times Tapped.	Total Yield.	Average Yield per Tree.	Period of Tapping.	No. of Times Tapped.	Average Area of Bark Excised.	Average No. of parings per inch	Weight of Sheet Rubber.	Weight of Scrap.	Total Yield of Rubber.	Average Total Yield per Tree.	Average Girth at 3' from Ground.			
						lbs. oz.	lbs.		lbs. oz.		Months		Ins.		lbs.	lbs.	lbs.	lbs.	Ins.		Ins.	
1	100	Sept., 1911	1 cut on ½ surface alternate days.	11th Sept., 1917	147	102 11	1·027	59	98 11	·986	4¾	144	11	13	145	25	170	1·7	25·6	350	26	13·5
2	100	Sept., 1911	1 cut on ½ surface daily.	11th Sept., 1917	293	171 8	1·715	119	110 2	1·101	4¾	283	16	17·6	236	24	260	2·6	26	695	43	16·2
3	50	Dec., 1904	V cut on ½ surface daily.	11th Sept., 1917	293	263 2	5·275	119	144 14	2·876	4¾	285	20	14·2	265	38	303	6·06	42·6	697	49	14·2
4	100	Sept., 1911	1 cut on ½ surface alternate days.	1st Oct., 1917	140	59 2	·851	51	47 10	·476	4	142	10	14·2	109	22	131	1·31	24·2	333	25	13·3
5	100	— 1908	2 cuts on ½ surface daily. Changed to 1 cut(2nd June, 1919).	11th Dec., 1917	286	455 0	4·55	53	75 6	·753	2	285	16	17·8	321	34	355	3·55	36·5	624	47	13·3
6	100 (1917-19) Now 50	Oct., 1905	2 cuts on ¼ surface daily.	27th June, 1918	...	...	...	188	463 12	4·637	8	232	34	13·6	208	37	245	4·9	41·4	232	34	13·6
6A	50	Oct., 1905	1 cut on ¼ surface daily.	2nd June, 1919	..	...	...	...	...	...	...	232	18	13	174	29	203	4·06	39	232	18	13·
7	42	— 1906	1 cut on ½ surface alternate days.	15th July, 1918	...	...	...	111	222 2	5·288	8½	143	14	10·2	177	27	204	4·88	40	254	22	11·5
8	90	Oct., 1905	2 cuts on ¼ surface daily.	13th Aug., 1918	...	...	...	197	383 4	4·257	7½	285	37	15·4	282	31	313	3·48	38	482	37	15·4
9	50	— 1908	1 cut on ½ surface daily.	1st Mar., 1919	...	...	...	...	...	...	...	285	26	10·9	204	29	233	4·66	33	285	26	10·9
10	50	— 1908	1 cut on ¼ surface daily.	1st Mar., 1919	...	...	...	...	...	...	...	285	27	10·5	173	29	202	4·04	36	285	27	10·5

single cut, and consequently with a corresponding proportion of scrap rubber. The extra time taken to make the second cut should also be considered, especially with inexperienced tappers.

The series giving the highest yield in proportion to the number of tappings is Series 7 (1 cut on ½ surface alternate days) the average per tree being 4·88 lbs. It must, however, be pointed out that this Series is planted as an avenue; the trees have plenty of room and are all large, as will be seen from the girth measurement. Series 7 shows the advantage of wide spacing, but it cannot be justly compared with any of the other series growing in less favourable situations.

Series 3 (V cut on ½ surface daily) gives the high average yield of 6·06 lbs. per tree. Here again it will be observed that the trees are all large—they are in fact the largest and oldest Para in the Gardens.

For a daily tapping, the ½ surface cut is not to be recommended, for unless the tappers are very skilful, they are apt to use up too much bark.

Two new series have been added:—No. 9 (1 cut on ½ surface daily) and No. 10 (1 cut on ¼ surface daily). Full details of these will be found in the tabulated record.

The whole of the series were rested from the 15th January to the 14th February inclusive.

The records for the two previous years are included for comparison, but it should be noted that the records for 1918-1919 are not for a full year.

During the year a new and larger rubber store was built.

Diseases.

Several more cases have occurred of the root disease reported in previous years. The disease has not yet been identified.

Treatment has consisted of:—

(1). Isolation of the infected areas by means of deep trenches.

(2). Excision where possible of the diseased parts, the wounds being afterwards treated with Carbolineum and Tar.

No other disease has occurred.

Meteorology.

The Meteorological Records for the year of all the stations have been compiled and will be found in Appendix No. 18.

The Latitude and Longitude given is in most instances approximate only.

The Observatory in the Botanic Gardens was transferred to a new site in December. The new site is to the rear of the Land Office, in a well exposed situation.

C. HAZEL,

Asst. District Agricultural Officer,

Curator, Botanic Gardens.

ANNUAL REPORT

ON THE

GOVERNMENT SEED FARMS

IN THE

TESO DISTRICT.

A. SIMSA FARM, SOROTI.

Weather.

The weather conditions during the past year were of the most variable description. Moderate falls of rain alternated with periods of draught from February to August. During the months April, May and June there was an entire absence of genial growing weather, the result being many food crop failures from insect attack, especially in Teso and Bukedi Districts. From August to January weather conditions were ideal, and a better season for late sown cotton has rarely been seen.

The following tables show the Rainfall and Temperatures during the year:—

TABLE No. I.

Month.	1915-16.		1916-17.		1917-18.		1918-19.		1919-20.	
	Rainy days.	Inches.	Rainy days.	Inches.	Rainy days.	Inches.	Rainy days.	Inches.	Rainy days.	Inches.
April	19	8·77	12	6·72	18	11·44	10	4·56	15	5·43
May	18	7·52	16	4·51	23	12·12	13	4·86	10	7·67
June	10	2·82	14	6·02	13	2·59	13	3·70	8	8·50
July	5	2·09	9	1·06	4	1·30	8	3·61	21	13·34
August	8	3·55	17	10·37	13	11·00	16	7·34	11	2·83
September	18	5·49	15	7·71	13	5·75	9	2·74	18	8·12
October	14	4·43	11	4·98	18	11·84	7	2·60	10	4·01
November	14	9·36	11	7·04	3	1·42	10	5·67	18	6·17
December	12	3·51	6	3·14	2	0·68	4	0·75	3	1·39
January	4	0·83	10	3·32	2	0·26	1	0·14	3	0·85
February	11	2·25	11	3·47	1	1·05	8	3·68	2	0·30
March	10	3·31	3	1·45	4	1·18	8	3·70	9	4·17
Total	....	53·93	....	59·79	....	60·63	....	43·35	....	62·78

Temperatures.

TABLE No. II.

Month.	Average Maximum.	Average Minimum.	Highest Recorded.	Lowest Recorded.
	o	o	o	o
April	87	66·8	94	65
May	86·5	66·2	95	64
June	87·1	64·3	93	64
July	86·2	65	90	62
August	88·2	63·3	91	63
September	90	63·8	92	58
October	88·8	64·3	96	62
November	88	64	95	60
December	93·2	61·5	98	56
January	94·6	62·8	101	57
February	98·1	66·2	103	61
March	90	67·5	101	64

The striking features of the above records are the abnormal rainfall in June and July, and the low minimum temperatures of December and January. The former was purely local but the latter was general throughout Teso and Lango.

COTTON SEED SELECTION AND PROPAGATION.

Accommodation.

On 25th September, 1919, the departmental house and office was struck by lightning and burned to the ground. Practically the whole of the records of seed selection work of the past 8 years was lost. This is a serious loss, and it will handicap the experimental work very considerably in the immediate future.

From the 25th September until the end of March, the writer had neither house nor office, and the work of selection was carried out under great difficulties.

Main Crop.

The main cotton crop on the farm was composed of selections Nos. 2 $(\frac{18}{16})$, 6 $(\frac{18}{14})$ of the Sunflower variety, a No. 9 $(\frac{25}{29})$ of the Allen variety, and at Kumi farm No. 12 (32) of the Nyasaland variety. These selections were taken from the best experimental plots of last year (*vide* Table No. III of Annual Report for 1918) and the areas were 10 acres, 15 acres, 10 acres and 12 acres respectively.

Sowing began on 1st May and finished about 30th June, and thus the whole of the crop was early sown. Heavy storms during June and July did much damage. Much of the June sown seed was washed away and had to be re-sown, and there was excessive soil wash. During July the whole labour supply was employed chiefly on drainage measures to prevent the entire removal of the top layers of the soil.

Needless to say the cotton crop got a bad start, and as the season went on, it was seen that early sowings were likely to prove a poor crop, and that cotton sown after 1st August would give the best yield.

Heavy storms in September destroyed any hope of an early picking of cotton, and the plants became leggy and boll-less.

In October there was a profuse setting of bolls but disease appeared immediately after the November rains and at least 90% of the bolls were affected.

Thus, although the crop was early sown, no picking was done before the end of the year. Stainer beetles appeared in force in October, and measures were taken to check the attack, and they practically disappeared in January. Nevertheless there was a very high percentage of stained and dirty cotton, and picking was difficult and costly.

The yield of cotton was also low and averaged about 250 lbs. per acre.

Selection Experiment Plots.

Plots of one quarter acre each were sown with 13 of the best individual selections of the previous year for further experiment, and the results obtained are shown on Table III attached to this report.

This crop was sown first of all, and in consequence, suffered rather more than the general crop from the adverse weather conditions and disease attacks, and the results are seen in the very low yields of cotton.

Individual Selections.

Fifty plants were selected in the field last year, and on examination in the office, it was found that 20 of the selections were suitable for propagation.

They were sown in single rows late in July, and divided by belts of maize to prevent mixing. Having been later sown than the general crop, successful results were obtained, and these are shown on Table IV. Unfortunately the records of the above selections were lost in the fire mentioned above, and so the numbers of the parental stock cannot be given.

General Crops.

Small areas of rice, maize, soya bean, buckwheat, millet, groundnuts, sweet potatoes and tobacco were grown. Some of these were successful, notably rice, maize and tobacco, the latter being the best crop since 1913.

The following are the areas sown and yields obtained :—

	Acres.	Yield per acre.	
Rice	3	... 750 lbs.	Excellent paddy.
Maize	2	... 500 „	Cobs small but well formed.
Buckwheat	½	... 450 „	
Millet (Calo)	3	... 400 „	Damaged by insects.
Tobacco	1¼	... 600 „	Excellent leaf.
Sweet potatoes	2	... 700 „	Dried potatoes.
Soya bean	1	... 150 „	Damaged by heavy rain in July.
Groundnuts	1	... a failure.	

Small areas of wheat and kidney beans were tried but these were failures.

B. KUMI FARM.

This farm was maintained during the past year as an auxiliary to the Simsa Farm, and as a centre of Ploughing Instruction in Teso District.

Cotton Crop.

An area of about 12 acres was sown with the selection No. 12 (32) Nyasaland in May and July. The crop did well up to September when it was severely damaged by a hailstorm, the early sowing suffering the most. It was again damaged by hail in November. This reduced the yield considerably, and, in common with the Simsa crop, the early sown crop did not boll well.

The total yield was 3,200 lbs. equal to 266 lbs. per acre. This cotton, which has been propagated by selection since 1913, retains its characteristics of great strength of staple and high ginning percentage with increasing silkiness. It is proposed to make this selection the main crop at Serere Farm next year.

Other Crops.

Small areas of rice, millet, maize and groundnuts were grown; of these, maize and millet were successful and gave good results, but the rice and groundnuts gave low yields.

C. SERERE FARM.

A sum of money having been allocated from last year's cotton tax for the establishment of two cotton seed selection stations in the Buganda and Eastern Province, it was proposed to make Serere the headquarters for seed selection work in the Eastern Province, and it is intended to erect permanent buildings there, and equip the station in a manner worthy of the importance of the work to be carried out.

A site has been selected on Kudam Hill within a mile from the Serere Camp, and the work of clearing the ground and preparation for the sowing season was begun on 1st January, 1920.

The site chosen has many of the points of a successful seed farm. The soil is a deep, rich, slightly reddish loam on a gravelly subsoil, and on a slight inclination which will ensure sufficient drainage and prevent water-logging. There is an ample water supply from several strong springs which have never been known to go dry.

For transport purposes there is close proximity to the metalled Kumi—Bugondo road. The farm can easily be connected by telephone with all parts of the Province.

Ploughing Instruction.

Good work was done during the year at the Ploughing School at Kumi, and large numbers of boys and oxen were sent in by the chiefs to be trained.

The high prices ruling for cotton have created a keen demand for ploughs, not only among the chiefs, but sub-chiefs and headmen as well. Nearly 100 new ploughs have been sold in the Eastern Province during the past year, the bulk of them going to the Kumi, Bukedea, and Usuku Counties of Teso.

A new Ploughing Instructor arrived in February and has made an inspection of ploughs in Teso District. This has revealed the fact (1) that a very large number of spare parts are required immediately for the ploughs in the District, (2) that the demand for new ploughs at a reasonable price is as great as ever, (3) that there are no spare parts and very few new ploughs remaining for sale in the Province, and (4) that the whole question of supply of, and repairs to, agricultural implements requires reorganising.

General Cotton Crop.

Famine conditions prevailed throughout the more important cotton growing parts of the Eastern Province up to the end of May. There were also many serious food crop failures necessitating resowings and the cultivation of large areas of sweet potatoes. Luckily the latter crop was a most successful one everywhere, and there is not likely to be any shortage of food during the ensuing year.

The above conditions prevented the early sowing of cotton, and the areas sown were generally smaller than in previous years. Fortunately the season was all in favour of late sown cotton, and crops sown after 1st August gave heavier yields than those sown before that date. The quality of the cotton was also better.

Lango.

The crop was earlier sown in Lango than in any other district. Lango also suffered from a series of severe rainstorms, sometimes accompanied by hail, which did considerable damage to the cotton crop. There was much disease on the bolls, especially around Kabiramaido and Luala, and the sample of cotton at many of the buying centres was stained and dirty.

The yield of cotton was good and averaged about 385 lbs. per acre. The average price paid to natives was 14 cents per lb.

Teso.

Some heavy yields were obtained in parts of Teso, especially so on the low-lying Lake areas. Serere County, which seldom fails to produce a good crop, gave a yield of over 600 lbs. per acre.

Disease showed itself in many parts of Teso District in December. In Usuku County the whole crop was affected so badly, that it was practically a failure. In that county a yield of about 150 lbs. only was obtained, and the quality of the cotton was inferior.

This failure spoiled the average for the whole district, which would otherwise have been very good. The average yield was about 335 lbs. per acre and average price to growers 15 cents.

Bukedi.

This District suffered more from the famine than any of the others. In spite of this, a comparatively large area of cotton was sown and, although late planted, it came to a full crop in all but some areas which had a rather low rainfall, notably in the Bugishu, and parts of Mbale and Bugweri counties. Pallisa County gave a heavy yield, and the whole crop averaged about 356 lbs. per acre. Average price paid to natives 16 cents per lb.

There was some boll disease but less than in Teso and Lango Districts.

Busoga.

The crop in Busoga was all late sown and a full crop was obtained except in the Kaliro area, which suffered from low rainfall. Disease was practically non-existent, and therefore the sample of cotton was better all over than in any of the other districts.

The average yield per acre was about 420 lbs. and the average price paid to natives about 21 cents per lb.

Picking and Handling Cotton Crop.

The picking and handling of the cotton crop by the grower shows slight improvement each year, but there is still room for considerable improvement.

In years such as the last one with much boll disease, the lack of proper handling of the crop was manifest in the mixed cotton offered at some of the buying centres. Propaganda and demonstration work have little effect as long as the grower can sell

mixed cotton at the same price as clean cotton. Chiefs of authority over their people can exercise a decided influence for good in respect to the proper handling of cotton, and this should be encouraged by the ginner by the payment of a premium over the ordinary price to the grower where deserving.

Ginning Percentages.

There are no records to hand of ginning tests by ginners this year. Tests made in this office show a slight improvement over the last few years, and the average for 70 such tests, which ranged from 32·5% down to 27·2%, was 30·2%.

Cotton Pests and Diseases.

Insect pests were apparently few compared with some previous years.

Aphis blight was practically non-existent and boll-worm was rare, while stainer beetle seemed to disappear almost entirely after December.

There was a marked increase in boll disease all over Teso, Lango and parts of Bukedi. The disease may have been caused by stainer beetles and plant bugs puncturing the bolls and letting in disease germs, which set up putrefaction inside the boll.

On a tour of inspection in December last, it was noticed that about 75 per cent of the bolls were affected in some of the fields in the Kumi and Bukedea counties. To a casual observer the bolls would appear to be healthy, but on close examination one or more small black blisters were seen on the carpels, and on opening the boll it was seen that disease had started immediately under the pericarp.

The remarkable features about the disease attack were the rapidity with which the attack developed, it was probably induced by the low night temperatures following the rains in November, and the rapidity with which it disappeared with the advent of the dry weather in December on all but the poorer soils.

R. G. HARPER,
Senior District Agricultural Officer.

TABLE No. III.

Report on the Examination of Cotton from Selection Experiment Plots.

No. of Plot.	Variety.	Yield per acre.	Average length of staple.	Strength.	Ginning percentage	Transmission.	Disease.	Remarks.
			Ins.					
1 ($\frac{14}{1}$)	Sunflower	190	1¼	V. Strong	29·3	Good	Slight boll disease.	A nice sample of long and regular staple.
3 ($\frac{18}{16}$)	do	170	1¼	Medium	28·7	Poor	Much disease on boll	Lint soft, brittle and wasty. To be discarded.
5 ($\frac{7}{26}$)	do	195	1⅛	do	28·4	Fair	do	Irregular and wasty. To be discarded.
7 ($\frac{7}{26}$)	do	210	1 3/16	Strong	30·7	Good	Slight disease.	Showy sample, regular and strong staple, little wasty.
9 ($\frac{18}{14}$)	do	250	1⅛	V. Strong	29·0	do	do	Good colour, short and regular staple.
10 ($\frac{18}{14}$)	do	180	1⅛	do	29·5	Fair	Much disease.	Very soft, wasty, and irregular. To be discarded.
11 ($\frac{25}{27}$)	Allen	110	1 3/16	Strong	28·4	Poor	Much disease on boll.	Poor sample, stained and immature. To be discarded.
12 ($\frac{25}{27}$)	do	120	1 3/16	do	28·8	Fair	do	Very stained, soft, and immature. To be discarded.
14 ($\frac{25}{28}$)	do	180	1 3/16	V. Strong	30·0	Good	Slight disease.	A nice sample, but slight irregularity.
16 ($\frac{25}{29}$)	do	170	1 3/16	do	29·5	do	V. slight disease.	A nice showy sample, good colour and lustre.
17 ($\frac{25}{29}$)	do	130	1 3/16	Strong	27·4	Poor	Much disease.	Very stained and immature fibre. Staple irregular. To be discarded.
18 (30)	Nyasaland	175	1¼	Medium	30·5	do	do	Much stain and immature staple, irregular and weak. To be discarded.
21 (32)	do	250	1 3/16	V. Strong	31·2	Good	No disease.	Good colour, no stain, staple regular and strong, an excellent sample.

Experiments will be continued with Nos. 1, 7, 9 and 21.

TABLE No. IV.

Report on the Examination of Individual Selection Plots.

No. of Plot.	Variety.	Diseases.	Insect pests.	Average Length of staple.	Strength.	Regularity.	Per cent of lint.	Remarks.
				Ins.				
1	Sun-flower	Boll disease.	Stainer beetle	$1\frac{1}{4}$	Strong	Regular	28·5	Fair colour—slight stain—long and regular—seed well covered.
3	do	Slight boll disease.	do	$1\frac{1}{4}$	do	do	29·4	Good colour—showy and good lustre, seed small and well covered.
5	do	V. slight boll disease	None	$1\frac{1}{8}$	V. strong	F. regular	29·4	V. good colour—No stain, staple irregular—mostly short.
6	do	do	None	$1\frac{1}{4}$	do	Regular	29·6	V. good colour—showy and good lustre, staple long regular. A nice sample.
7	do	do	Slight stainer	$1\frac{5}{16}$	do	V. regular	30·4	Excellent sample of long and regular staple—seed medium and well covered.
8	do	do	None	$1\frac{1}{4}$	Strong	do	30·1	V. good colour—showy and good lustre—seed large and well covered.
9	do	do	Slight stainer	$1\frac{1}{8}$	do	F. regular	28·4	Good colour—staple short, harsh, and irregular—seed large and well covered.
10	Allen	Slight boll disease.	do	$1\frac{1}{4}$	V. strong	Regular	29·6	An excellent sample of long regular and strong staple—seed large and well covered.
13	do	do	do	$1\frac{1}{8}$	Strong	F. regular	29·1	Good colour—staple short, harsh, irregular, and wasty—seed large and well covered.
14	do	do	do	$1\frac{1}{4}$	do	Regular	30·2	Good colour—showy and lustrous—seed small and well covered.
16	do	V. Slight boll disease	None	$1\frac{3}{16}$	V. strong	V. regular	30·7	An excellent sample—showy, lustrous and regular—seed large and well covered.
18	Nyasa-land.	do	Slight stainer	$1\frac{1}{8}$	do	do	31·3	A good sample of short staple of great strength and regularity.
19	do	do	None	$1\frac{1}{8}$	Strong	do	30·4	A showy sample—seed large and well covered.
20	do	do	None	$1\frac{3}{16}$	do	F. regular	31·5	A nice sample except for a little irregularity in staple.
21	do	None	None	$1\frac{3}{16}$	V. strong	V. regular	31·7	Excellent sample very showy and lustrous.

Further experiments will be carried out with ten of the above selections.

ANNUAL REPORT

OF

THE CHIEF VETERINARY OFFICER.

Staff.

The Chief Veterinary Officer left Uganda for leave on 19th August, and while in England attended a conference of Colonial Veterinary Officers convened to draw up a comprehensive scheme for the conservation of cattle and other stock of Tropical Africa. Mr. Richardson was acting as Chief Veterinary Officer from 19th August to the end of the year. Mr. Poulton went on leave on 16th March, 1920. Mr. Hart returned from England on 3rd November, 1919, on demobilisation from the Army. Captain Bowhill arrived on first appointment on March 29th, 1920. Mr. F. Strauss was appointed as a supernumerary Stock-Inspector on 23rd May, 1919, and Mr. J. J. Victor as a Stock-Inspector on 2nd February, 1920. The Staff of the Division in the Protectorate averaged through the year a Chief Veterinary Officer, 2 Veterinary Officers, 4 Stock-Inspectors and 3 Veterinary Assistants, but owing to illness and other causes there was usually only one of the two Veterinary Officers available for effective field work. Mr. Meeke did not arrive in the Protectorate during the year under review.

Rinderpest.

2. This disease had swept through the Buganda Province during the previous year and appeared in the Toro and Ankole Districts of the Western Province in the early months of 1919. Owing to the rapid spread of the disease, shortage of staff, and difficulty of getting serum quickly to the districts, effective work could not be commenced till the end of March, 1919, and the year opened with Rinderpest just West of Mbarara in Ankole, wide-spread in the Masaka District of Buganda and fairly prevalent in the South-East corner of the Toro District. The available Veterinary Staff had reached the districts but there was still very little Anti-Rinderpest Serum on the spot.

Buganda Province.

A few scattered outbreaks of Rinderpest occurred in the Kiagwe County of Mengo District, but, thanks to help given by the District Officers and Chiefs in enforcing quarantine measures, these outbreaks were stamped out and no serious loss of cattle occurred. In Masaka District only small groups of cattle had escaped the disease which had been devastating the district since December, 1918. As far as staff and serum allowed these groups were immunised. This district is reported to have lost 40,000 cattle out of 52,000 during the epidemic.

Ankole District, Western Province.

Rinderpest had appeared in Eastern Ankole in January, 1919. At the end of March, 1919, it had swept the Eastern half of the District and had appeared to the West of Mbarara. Veterinary Officer Poulton and Stock-Inspector Gould reached the District at the end of March. It was thought that there would be considerable opposition to inoculation or European control of the cattle by the natives of this district, who are extremely superstitious. Thanks, however, to the preparatory propaganda which had been carried out by the last two District Officers, the enlightenment and loyalty of certain chiefs—notably Nuwa Mbuguta, the Katikiro—the tact displayed by Mr. Poulton in dealing with the native superstitions and the whole-hearted assistance given by Mr. Sullivan, the District Commissioner, and by the Police Officer, the disease was quickly got under control. Mr. Poulton commenced the attempt to create an immune belt of cattle immediately to the West of Mbarara by drawing the cattle from this area Eastward, immunising them and then returning them to their grazing grounds. By the beginning of November this belt appeared to have been completed without Rinderpest having broken out to the West of it, and Mr. Poulton was withdrawn and replaced by Veterinary Officer Hart. Towards the end of December, however, it was found that Rinderpest existed in the county of Kazara, West of this belt, where cattle were extremely numerous and the Chiefs

less amenable to control and, in spite of every effort of Mr. Hart and the two Stock-Inspectors with him, the disease spread and appeared in the neighbouring Belgian territory, and, in March, 1920, in the Ruzumburu County of Kigezi District.

Kigezi District.

In September, 1919, game were reported to be dying on the Southern shore of Lake Edward. The country along the shore of this lake is uninhabited and infested with buffalo and other game. Hunting parties were introduced to try to prevent the infected game breaking West or South. The object was partly attained in that the game were kept out of inhabited areas which are very rich in stock. The game, however, did break Westward and the infection spread to the Ishasha valley and the Congo territory. Rinderpest in cattle broke out in Kigezi District in March, 1920, probably introduced from Ankole but in the meantime extra staff and serum had been obtained, and it is hoped a large proportion of the cattle in this district will be saved.

Toro District.

Only one Stock-Inspector was available for this District. Rinderpest broke out there in January, 1919, but thanks to the assistance given by the District Officers and Chiefs, has only spread through the Southern half of the district which is infested with enormous numbers of buffalo. A main quarantine line was established along the Kampala—Fort Portal main road and the disease has never spread into the cattle areas North of that line. As many as possible of the cattle South of the line were immunised, but owing to the shortage of staff and delays due to the bad health of the Stock-Inspector in charge only a small proportion have been done.

Eastern Province.

Small outbreaks of Rinderpest continued throughout the year in all the districts of this Province. Only one Stock-Inspector was available for duty and he was able to do little more than the immunisation of transport animals.

Inoculations.

The following cattle were inoculated during the year with Anti-Rinderpest Serum and virulent blood from strains collected locally :—

	Adults.	Calves.	Average Mortality from all causes in Adults.
Buganda Province ...	1,638	220	12·5%
Toro District	3,727	780	20%
Ankole District ...	30,393	685	11·9%
Eastern Province ...	1,662	98	Unknown.

The percentage of loss in calves was about 60%. In adults the high average mortality in Toro was chiefly due to complications with Trypanosomiasis. In Ankole losses varied greatly in different inoculation centres. The losses would have been much less but for complications with Trypanosomiasis and Red Water. 275 cattle were re-inoculated to test immunity but did not react to the second inoculation.

Pleuro-pneumonia.

3. A disease which may have been Pleuro-pneumonia was reported in Kitgum in June, 1919, and a definite report of its existence in Karamoja was received in November, 1919. In Karamoja it is estimated to have caused a loss of 40% to 50% of all cattle in the District. In December the disease was found to exist in Teso and Busoga Districts and was suspected in Bukedi. All movement of cattle was stopped, except of transport animals, which were kept under observation and moved into quarantine camps if any disease was suspected. Shortage of staff made further measures impossible as there was only one Stock-Inspector available for the whole Province till February when a second man, almost entirely inexperienced, was obtained. Outbreaks were scattered and almost all directly traceable to the movement of cattle from Karamoja. The measures adopted appeared to be successful in arresting further spread of the disease pending the arrival of extra staff.

Trypanosomiasis.

4. This disease was encountered during the year in Ankole, Toro, Mengo, Mubendi, Busoga, Bukedi and Lango Districts, that is in almost every district in which

work was being carried on. In Ankole losses were reported to be heavy but this appears to have been mainly due to a movement of cattle into Tsetse areas in the hope of avoiding Rinderpest, and, subsequently, the junction of the remnants of herds with other remnants from herds which have suffered from Rinderpest. In Toro many cases were encountered in the inoculation camps and it is much to the credit of Mr. Poestkoke that he recognised this danger at once, and by early action in isolating affected animals probably prevented a serious epidemic. In Buganda two Transport herds working from Mityana to Kampala were completely wiped out. These herds had been working four years with only very small losses, and have now been replaced with fresh cattle which have been working satisfactorily over the same roads for some months. In Busoga and Lango extension of old Tsetse areas is believed to have occurred leading to the infection of the cattle along their borders. In Kampala no cases have occurred since dipping commenced regularly in July. This is remarkable in view of the regularly incidence of cases usually occurring. Of the cases under treatment in Kampala during the year, 23 were dismissed as cured, 8 died and 7 were slaughtered as they failed to respond to treatment. No cases of relapse after cure have been encountered though a large proportion of the animals have been under weekly examination for some months after treatment was discontinued. The mortality in untreated animals, which have come under observation on various estates, was apparently 100%.

Foot and Mouth Disease.

5. One outbreak of this disease was encountered in Ankole in cattle brought in for inoculation against Rinderpest.

Tuberculosis.

6. No further cases of this disease came under observation during the year.

Anthrax.

7. One outbreak of this disease came under observation in Ankole, being reported as Rinderpest.

Biting Flies.

8. Stomoxys were extremely numerous during the months of May and June, 1919, in Mengo District and large numbers of cattle are believed to have died simply from worry caused by these flies. Owners who adopted the plan of keeping cattle in smoke huts during the day and grazing them at night reported a cessation of deaths and a marked improvement in the condition of their cattle.

Transport Cattle.

9. In the Eastern Province work was continued satisfactorily until the outbreak of Pleuro-pneumonia when it had to be interrupted round Mbale. On the Jinja—Iganga Road outbreaks of Trypanosomiasis occurred, and also amongst the Public Works cattle in Jinja station. These cattle were moved to Kampala for treatment. In Masaka District Rinderpest interrupted work in the early months of the year but it was later resumed. In Toro District the Transport Department herd was successfully immunised against Rinderpest and continued work with little interruption, but in the spring of 1920 lost heavily from Trypanosomiasis. Herds working between Mityana and Kampala were almost wiped out by Trypanosomiasis but have been replaced successfully by Toro cattle. In Kiagwe heavy losses occurred, believed due to worry by Stomoxys. During the year there was a very great demand for bullocks for transport and plantation work but the supply has become so scanty that owners have found it very difficult to even replace losses. Work during the year has, however, tended to show that with proper supervision and with Veterinary assistance available, the danger from Trypanosomiasis, which has been the chief cause of loss to working cattle, can be successfully combatted.

The Kampala Dip.

10. The dipping, which had to be discontinued owing to all the available staff being employed on Rinderpest work, was restarted in June, 1919, and continued regularly throughout the rest of the year. There was an immediate cessation of cases of Trypanosomiasis in Kampala in dipped herds—though cases continued in two undipped herds—and a marked improvement in the general condition of the cattle in the Township. Owners have also informed me that they have had practically no loss of calves since dipping was commenced regularly. Dipping has been done on Wednesday and Saturday in every week

using Laboratory dip of a 3 day strength. Calves have not been dipped till two months old. The owners state that the calves contract East Coast Fever in a mild form, but further observation will be necessary before any definite statement as to the immunity to East Coast Fever of this young stock can be made.

Diseases of Equines.

11. *Lymphangitis.*—Two cases of Ulcerative Lymphangitis in mules were treated during the year. No cases of Epizootic Lymphangitis came under observation. The Protectorate was, however, practically denuded of ponies and mules during the War.

Diseases of Donkeys.

12. Twenty Donkeys were brought down from Kitgum to Kampala. Of these 8 died. A definite diagnosis of the nature of the disease was not obtained. A similar disease was encountered in Karamoja in donkeys moved from Turkana to Karamoja.

Diseases of Sheep and Goats.

13. No serious outbreaks of disease were reported amongst these animals during the year. Cases of Mange in goats were encountered in Busoga.

Diseases of Dogs.

14. *Piroplasmosis.*—A very large number of relapses occurred after treatment, and in one case Trypan Blau had to be injected four times before a cure was obtained. A disease resembling Rabies was reported in Ankole but no cases came under observation, and apparently it rapidly died out. Several cases of infection of dogs with Filaria came under observation, the disease being very fatal.

Diseases of Fowls.

15. Fowl Diphtheria was very prevalent in June and July, 1919, and several outbreaks of Fowl Cholera occurred round Kampala later in the year. A few cases of Tuberculosis were also encountered.

16. Kampala Slaughter House Returns.

from 1st April, 1919, to 31st March, 1920.

Months.	Animals Examined.							Condemnations.	
	Cattle.	Sheep.		Goats.				Carcases.	Parts.
		Male.	Female.	Male.	Female.	Wether.			
						Sh.	Gt.		
April	5	17	5	66	9	....	9	....	4
May	21	19	4	63	39	....	1	3	11
June	17	7	10	50	12	....	....	1	6
July	44	3	1	16	1	....	1	1	18
August ....,	42	4	....	5	5	....	....	....	17
September ... ...,	51	16	9	19	16	....	2	2	15
October	52	17	5	28	18	1	12	....	15
November	38	16	3	41	29	....	22	....	16
December	43	40	11	70	29	....	7	1	18
January	39	29	29	36	28	....	7	1	25
February	31	26	5	68	22	2	3	....	19
March	30	42	3	116	4	2	4	....	44
Total	413	236	85	578	212	5	68	9	208

17. Summary of Slides Examined, Kampala.

Cattle.		**Dogs.**	
Trypanosomes ...	225	Piroplasma	21
Filaria	1	Filaria	1
Negative	6,770	Negative	35
East Coast Fever ...	18		
Donkeys.		**Fowls.**	
Negative	54	Negative	6

18. **Cases Treated at the Veterinary Dispensary.**

Cattle	246	Goats	1
Dogs	77	Cats	4
Mules	6	Fowls	9
Donkeys	11	Parrots	2
Sheep	2	Monkeys	1

Health of Staff.

19. The health of most of the European and Asiatic staff throughout the year was bad. This was, I think, ascribable largely to Influenza which had left most of the officers weak, great pressure of work which allowed officers no change from the discomforts and bad feeding of the field duties, and lack of housing which prevented a man when sick being able to recuperate in comfort. I have to thank all the field staff for carrying on in emergencies when they should really have been off duty from illness. This particularly applies to Veterinary Officer Mr. Poulton, and Stock-Inspectors, Messrs. Poestkoke and H. Strauss. I much regret to have to report the death of the Clerk, Mr. Fialho, from Blackwater on 8th May, 1919.

General.

20. The year under review has seen cattle diseases more widely spread in the Protectorate than they have been since the creation of a Veterinary Department. Owing to the spread of the infection through game and the small staff available, it proved impossible to prevent the spread of Rinderpest through Buganda Province to the rich cattle districts of Masaka and Ankole. Finally the outbreak of Pleuro-pneumonia in the Eastern Province, when all the available staff were insufficient to cope with Rinderpest in the Western Province and were all fully employed there, gave a very black outlook to the cattle industry of the Protectorate. I have to thank the whole of the Staff of the Division for their untiring efforts in facing an impossible task. These efforts, although not preventing an enormous loss of cattle, did delay the spread of the diseases and gave time for the arrival of extra staff, which it is hoped will now be able to save a considerable number of cattle which I had looked on as certainly lost to the Protectorate. Mr. Poulton's work in Ankole stands out pre-eminently. On his arrival in the District, Rinderpest appeared to be completely out of hand but he succeeded in holding it, practically without extension, for six months. This gave time for us to arrange to deal with the cattle of Kigezi and Western Ankole, and gave the Belgian authorities nearly a year longer than was at first hoped, in which to complete their defensive measures for Ruanda. Finally, I must thank the District Commissioners, who in almost every district have given all possible assistance to the work of this Division, particularly Mr. Sullivan, in Ankole, and Mr. Philipps, in Kigezi. The latter took charge of the hunting operations and quarantine work in Kigezi, and his real interest in the stock of his district has been largely responsible for keeping it clear of Rinderpest so long and making Veterinary work possible there at all.

I attach a schedule showing deaths reported amongst Government live stock in the various districts during the year.

U. F. RICHARDSON,
Acting Chief Veterinary Officer.

Schedule showing Deaths reported amongst Government Live Stock during 1919-1920.

Name of Districts.	Bullocks.	Cows.	Calves.	Donkeys.	Buffalo.	Sheep.	Trypanosomiasis.	Debility.	Old Age.	Cause of death not known.	Accidental.	Killed.	Pleuro-pneumonia.	Rinderpest.	Piroplasma.	Lymphangitis.	Diarrhœa.	Arsenical Poisoning.	Gastro-Enteritis.	Pneumonia.	Colic.
Kampala ...	30	—	—	11	—	—	20	3	2	3	—	1	—	—	2	1	—	4	1	4	—
Entebbe ...	17	—	1	—	—	1	—	1	14	3	—	—	—	1	—	—	1	—	—	—	—
Jinja ...	14	—	—	—	—	—	10	—	—	4	—	—	—	—	—	—	—	—	—	—	—
Masaka ...	28	—	—	—	2	—	—	—	—	—	—	1	—	29	—	—	—	—	—	—	—
Toro ...	38	—	—	—	—	—	27	—	—	6	4	—	—	—	—	—	—	—	—	—	1
Hoima ...	2	—	—	—	—	—	—	—	—	1	—	—	—	1	—	—	—	—	—	—	—
Lango ...	14	23	—	—	—	—	—	—	—	2	—	—	—	35	—	—	—	—	—	—	—
West Nile ...	8	55	134	—	—	—	—	—	—	140	57	—	—	—	—	—	—	—	—	—	—
Kitgum ...	4	8	7	—	—	—	—	—	—	14	—	—	5	—	—	—	—	—	—	—	—
Soroti ...	3	—	—	1	—	—	—	—	1	1	1	1	—	—	—	—	—	—	—	—	—
Masindi ...	—	2	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—	—	—	—	—
TOTAL ...	158	88	142	12	2	1	57	4	17	176	62	3	5	66	2	1	1	4	1	4	1

ANNUAL REPORT

OF THE

ACTING ENTOMOLOGIST FOR 1919-20.

The Entomologist proceeded on leave towards the beginning of September, 1919, and since then I have been in charge of his work. No investigations were undertaken during the period of my acting, but a considerable number of queries was answered, and help was given to those endeavouring to combat pests.

The pests recorded in previous years have been more or less in evidence, some to a greater extent than others, and there does not fall to be recorded any new pest of importance. The twenty-eight pests of coffee listed in last year's report have been either mentioned or reported as causing loss and damage, but, of the complete list, only the Berry Borer, Variegated Bug, Thrips, Green Fly and Root Scale (*Pseudococcus citri*, Risso) have been of real importance since September. In all the outbreaks of these pests, the combative measures recommended, along with, in certain cases, changes in climatic conditions, have been successful in checking the attacks.

No pests of cacao and Para rubber have been reported in the last seven months, and, in the case of cotton, only stainers have been brought under notice.

Of other insect pests that have been the subject of enquiries, mention might be made of white ants, the banana borer, and one case of swarming locusts.

No special collecting has been done since September. The Kampala Museum has been enriched by the addition of a collection of native manufactures and curios from the exhibition held at Hoima in January, 1920. For this we are greatly indebted to the Acting District Commissioner of Bunyoro. Unfortunately, a worthy space for the suitable display of the articles is not at present available.

The following list shows the countries of origin of consignments of plants, etc., inspected during the whole year:—

United Kingdom	21
France	6
South Africa	7
Australia	1
British East Africa	9
Tanganyika Territory	2
United States, America	4
Zanzibar	1
India	11
Ceylon	2
West Indies	1
	65

W. SMALL,
Acting Entomologist.

ANNUAL REPORT

OF THE

GOVERNMENT BOTANIST FOR 1919-20.

I returned from military service and resumed my civil duties on February 5, 1919.

Since the Entomologist proceeded on leave at the beginning of September, 1919, I have acted in his stead in addition to my other duties.

Thanks to the acquirement of several pieces of apparatus which were lacking, much more extended mycological work than was possible in previous years has been undertaken. This is very satisfactory, but it must be remarked that the time available for laboratory investigations is always liable to be, and actually has been greatly, cut down at intervals by the demand for my services on field instructional or inspectional work. There is ample need for both these branches of mycological work, particularly in connection with bark and cortex diseases of Para rubber. The present position is unsatisfactory both from the point of view of the planter and myself, and can be remedied only by an increase in staff. This increase should include not only a scientific officer capable of assisting in laboratory work, but also at least one officer whose duties would be entirely those of a field patrol officer. The latter need not be a highly-trained researcher, but should have a knowledge of agriculture under local conditions and be capable of initiating and supervising field experiments in the control of diseases and pests. He should be assisted by a capable native or natives in whose hands would lie the responsibility of instructing and helping those chiefs and others who possess, say, plots of Para rubber, and are desirous of tapping their trees and preparing the rubber to the best advantage.

Coffee.

There have deen during the year many reports of the drying-up or dieback, as it is called, of coffee trees. The part played by the various fungi associated with dieback has been investigated. Species of *Colletotrichum*, *Phona* and *Pusarium* were grown in pure culture, and series of inoculation experiments were carried out. The results of the latter, the development of the fungi in culture, and recommendations for avoiding dieback are incorporated in Circular No. 4 which is now in the press. The question of dieback has been fully discussed in it, and it is hoped that the circular will prove useful.

In continuing the investigation of "broken" coffee beans begun in 1916, it was shown that the Variegated Bug carried in or on its beak and on its legs the pycnospores of the same species of *Phoma* as is found on the broken cotyledens and on the branches of the trees. It was concluded, therefore, that the Bug was implicated in the damaging of the beans, and the theory put forward in 1916* was confirmed. This matter is also discussed in Circular No. 4.

Root diseases of coffee have been negligible, and *Hemileia* disease, while always present and no doubt responsible for a progressive weakening of attacked trees, has been countered of late by the increased attention now given to cultivation. Other leaf-diseases, *e.g.*, *Cercospera coffeeicola*, B. and Cke., have not been in evidence.

Hevea.

As in the case of coffee, so in the case of *Hevea*, root diseases have been negligible. No cases of Brown Root Disease (*Hymenoehaete noxia*, Berk.) or of Wet Root (*Sphaerostible repens* B. and Br.? *Poria* sp.?), both of which have been found in previous years, have been reported, nor has *Ustulina zonata* (Lev.) Sacc., yet attacked this host-tree. This immunity is due to the using of elephant-grass land instead of forest areas for planting purposes, and the consequent lack of danger from decaying stumps. A new danger may arise, however, in the thinning operations now necessary on some estates. I refer to the leaving of *Hevea* roots in the ground, and it is to be hoped that those in charge of the cutting-out of trees will see that the work is done thoroughly. This remark applies also to those who are cutting out coffee or cacao from among *Hevea*.

* See Ug. Planters' Assoc. Year Book, 1916-17, p. 135.

Dieback has not been common, and Pink Disease is unknown. There is, however, some ground for concern at the prevalence of bark and cortex diseases, and there is every necessity for their prompt treatment. The use of Brunolinum has been recommended and taken up. These diseases have been studied in the field more than in the laboratory, and notes of their symptoms and mode of occurrence have been published in Circular No. 3. This circular contains an account of all the diseases of *Hevea* in Uganda at the present day with recommendations for treatment, and that part of it dealing with bark and cortical diseases will be amplified as knowledge of the diseases increases. The microscopic examination of diseased tissues, particularly those of what is known as Brown Bast, has not disclosed the presence of any mycelium or other part of a fungus, and, while observations have been made on the changes induced in diseased tissues, they have not helped to elucidate the cause of the disease. Further investigation is in progress.

Cacao.

This crop has gone greatly out of favour, and little work has been done on its diseases. In the study of the fungi of coffee dieback, the opportunity was taken to conduct a series of cross-inoculations with species of *Colletotrichum* from coffee and cacao-pod material. The results, it is hoped, will be published. As they are, on the whole, of more interest to the scientist than to the practical planter, they need not be set forth here in detail, but it might be mentioned that it has been shown that the coffee *Colletotrichum* is capable of producing a cacao pod-rot, and that the cacao-pod *Colletotrichum* is capable of infecting coffee. Rotting cacao-pods with pink spore-masses of *Colletotrichum* should therefore be burned; they are a danger to coffee.

Native Crops.

Areolate mildew (*Ramularia areola*, Atk.) and boll-anthracnose (*Colletotrichum gossypii*, Southw.) of cotton have been reported from various districts. The best control measure for these diseases is the thorough carrying out of the annual burning after the harvest. A wilt of sim-sim requires thorough investigation. Material from the Northern Province was examined, and a species of *Fusarium* was isolated from it and grown in pure culture. Further work was impossible owing to enforced absences from headquarters.

Rust (*Puccinia graminis*, Pers.) and loose smut of wheat (*Ustilago tritici*, Jens.) were found during the year. The latter was reported for the first time; it does not appear to have caused much harm.

Ornamental and Shade Plants.

Wilts of Carnations, Larkspurs, and Love-in-a-Mist, all from the same garden, were studied and found to be due to one species of *Fusarium* in the soil. The fungus grew rapidly in pure culture. At the same time and in the same place, a wilt of *Cosmos* (*bininnatus?*) occurred. No fungus was obtained from the *Cosmos* material, but the results of cross-inoculation experiments point to the same *Fusarium* as the cause of the *Cosmos* wilt. Lots of all four plants were grown in pots of sterilised soil from fresh cuttings and seed obtained from Nairobi, and a series of three pots of each was inoculated with the *Fusarium* from Carnation, Larkspur and Love-in-a-Mist respectively. The results were remarkably consistent; the wilts were reproduced in all, and control plants remained healthy. Carbolic acid and Fungal were tried as soil-disinfectants in the affected beds, and the latter gave the better results. Time has not been found for extended trials of soil-disinfectants, but there is no doubt that solutions of some easily obtainable and easily handled substance, such as Izal, would prove effective. The addition of one drop of 10% Izal to the culture medium (prune-agar) in a $3\frac{1}{2}$ ins. petri dish prevented growth of the *Fusarium*. It is hoped to publish an account of these wilts.

Leaf diseases of roses were as much in evidence as usual, and a canker similar to that figured on page 416 of Massee's "Diseases of Cultivated Plants and Trees" was found for the first time.

Wet Root Rot had been previously recorded on coffee, cacao, *Hevea*, ceara, tea and guava plants, and it is now necessary to extend this list to include *Casuarina equisetifolia*, *Hibiscus*, *Eucalyptus* and mango. These have been found affected during the year.

Albizzia moluccana, planted as coffee shade, has succumbed to root disease in two instances. In one, *Fomes lucidus*, Fr., was gathered on the collar of a tree which had been dead for some time, and, in the other, *Rosellinia*-like fructifications were discovered on excavation on the undersides of the main roots near the trunk of the tree. Neither of the two fungi have attacked the interplanted coffee.

Grevillea robusta is subject to a dieback which is accompained by gummosis. The leading shoot or a branch on any part of the tree may be affected. An ascomycete has been obtained from diseased trees and identified at Kew as *Nectria flocculenta* v. Hoehn. It is in all probability the cause of the dieback.

Visits.

Numerous visits to estates have been paid during the year, especially in the Toro, Masindi, Hoima, Chagwe and Kampala Districts.

Herbarium.

I have to thank again the Director of Royal Botanic Gardens, Kew, for the identification of material sent to him. Little collecting has been done during the year.

Circulars.

Two circulars dealing respectively with *Hevea* diseases and Coffee die-back have been published, and material is being acquired for a further circular dealing with diseases of shade and ornamental plants.

W. SMALL,
Government Botanist.

APPENDICES.

Appendix 1.

Native Agriculture—Live Stock.

Province and District.		Cattle.	Sheep.	Goats.	Horses.	Mules.	Donkeys.
Buganda :—	Mengo	26,493	8,295	108,532	...	4	10
	Entebbe	3,179	2,555	24,317	...	1	2
	Masaka	14,465	4,026	14,404	...	...	4
	Mubendi	13,128	3,185	24,997	...	...	...
	Total ...	57,265	18,061	172,250	...	5	16
Eastern :—	Busoga	39,500	18,000	45,000	...	4	4
	Bukedi	40,000	*	*	...	4	100
	Teso	156,736	27,738	68,605	...	3	40
	Lango	20,000	64,000	141,000	...	4	21
	Karamoja, Lobor ...	100,000	...	...	...	...	...
	Total ...	356,236	109,738	254,605	...	15	165
Northern :—	Masindi	799	1,130	10,967	...	1	1
	Hoima	1,249	1,393	7,093	...	...	3
	Gulu	*	*	*	...	2	10
	Kitgum	*	*	*	...	6	50
	West Nile ...	35,000	22,000	50,000	...	2	4
	Total ...	37,048	24,523	68,060	...	11	68
Western :—	Toro	19,283	15,085	36,711	...	2	5
	Mbarara	144,000	50,000	250,000	...	...	5
	Kigezi	*	*	*	1	...	...
	Total ...	163,283	65,085	286,711	1	2	10
Rudolf :—	Turkwel ...						
	Turkana ...		No basis for an estimate.				
	Dabossa ...						
	GRAND TOTAL ...	613,832	217,407	781,626	1	33	259

* Number unknown.

Native Agriculture—Crops Under Cultivation.

Province and District.	Potatoes.		Millets.		Rubbers.		Cotton.	Coffee.	Plantains	Maize.	Dhal.	Beans.	Sim-Sim.	Sugar Cane.	Ground-nuts.	Cassava.	Tobacco.	Wheat.	Rice.	Chillies.	Cacao.	Peas.	Pine Apples.	Lucerne.	Onions.
	Sweet.	English.	Matama.	Wimbi.	Para.	Other.																			
	ACRES.																								
BUGANDA :—																									
Mengo ..	117,500	80	200	500	750	350	27,000	3,300	367,000	3,960	*	4,000	3,000	450	1,800	1,000	100	10	180	50	50	*	*	*	*
Entebbe ..	9,153	135	216	193	38	504	5,999	1,000	75,000	3,638	*	2,232	614	688	2,161	1,725	104	23	21	49	6	96	..	..	..
Masaka ..	6,120	70	2,370	598	110	10	11,700	5,135	50,300	3,142	*	320	1,584	475	650	220	550	35	1	28	..	1,708	1,100	..	..
Mubendi ..	25,000	40	1,000	10,000	..	20	2,780	500	25,000	1,040	100	2,000	2,000	100	300	2,500	1,000	100	20	100	..	300	100	..	..
TOTAL ..	157,773	325	3,786	11,291	898	884	47,479	9,935	517,300	11,780	100	8,552	7,198	1,713	4,911	5,445	1,754	168	222	227	56	2,104	1,200	..	..
EASTERN :—																									
Busoga ..	..	..	..	..	..	..	28,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Bukedi ..	..	..	..	..	..	..	23,000	..	..	..	..	..	..	..	..	..	..	..	500	..	..	..	..	..	..
Teso ..	36,000	..	25,000	50,000	..	..	39,000	..	800	3,500	..	20,000	1,000	..	7,000	4,000	..	..	50	..	..	..	..	..	..
Lango ..	..	..	..	..	..	..	16,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Karamoja } Lobor }										NO BASIS FOR AN ESTIMATE.															
TOTAL ..	36,000	..	25,000	50,000	..	..	106,000	..	800	3,500	..	20,000	1,000	..	7,000	4,000	..	..	550	..	..	..	..	..	..
NORTHERN :—																									
Masindi ..	13,112	5	500	3,660	47	49	1,617	132	4,517	745	..	755	1,860	49	55	430	184	1	11	..	..	1,620	.	..	9
Hoima ..	13,002	93	1,933	10,633	..	12	4,505	61	1,099	4,635	69	8,172	5,801	67	592	2,158	2,340	16	8	95	..	304	..	..	149
Gulu ..	..	1	..	..	..	..	1,000	5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kitgum ..	10,000	..	25,000	25,000	..	..	50	..	..	50	..	5,000	20,000	..	5,000	50	..	..	20	..	..	..	..	..	..
West Nile	7,000	..	30,000	40,000	..	..	..	..	20	600	..	5,000	20,000	..	800	300	20	..	480	..	..	12,000	..	..	..
TOTAL ..	43,114	99	57,433	79,293	47	61	7,172	198	5,636	6,030	69	18,927	47,661	116	6,447	2,938	2,544	17	519	95	..	13,924	..	..	158
WESTERN :—																									
Toro ..	10,000	5	1,000	30,000	..	..	500	10	12,000	1,000	..	20,000	1,000	400	800	500	5	500	15	..	..	2,000	..	..	5
Mbarara ..	25,000	20	5,000	18,000	..	5	1,200	350	16,010	1,190	..	11,500	150	15	500	200	350	10	..	5	..	11,000	..	..	..
Kigezi ..	5,000	150	20,000	30,000	..	..	..	8	26,000	5,000	..	40,000	..	..	..	..	200	20	..	..	..	85,000	..	2	..
TOTAL ..	40,000	175	26,000	78,000	..	5	1,700	368	54,010	7,190	..	71,500	1,150	415	1,300	700	555	530	15	5	..	98,000	..	2	5
RUDOLF :—																									
Turkwel } Turkana } Dabossa }										NO BASIS FOR AN ESTIMATE.															
GRAND TOTAL	276,887	599	112,219	218,584	945	950	162,351	10,501	577,746	28,500	169	118,979	57,009	2,244	19,658	13,083	4,853	715	1,306	327	56	114,028	1,200	2	163

* Not known.

European Agriculture.

Compiled from Returns of 204 Plantations.

Province and District.	Number of Estates.	Total Acreage taken up.	Total Acreage under Cultivation.	Total Acreage not Cultivated.	Acreage of Coffee (*Arabica*).		Acreage of Coffee (*Robusta*).		Acreage of Para Rubber.		Acreage of other Rubbers.		Acreage of Cacao.		Cotton.	Wheat	Maize.	Rice.	Tobacco.	Sugar.	Tea.	Miscellaneous Crops.
					Under 2 years.	Over 2 years.	Under 2 years.	Over 2 years.	Under 5 years.	Over 5 years.	Under 5 years.	Over 5 years.	Under 5 years.	Over 5 years.								
BUGANDA:—																						
Mengo	86	41,736	16,366	25,370	441	9,750	3	218	5,499	6,114	...	210	909	2,091	252	...	330	5	...	23	3	51
Entebbe	15	7,225	3,121	4,104	277	2,188	...	2	1,084	1,354	...	...	...	164	6	...	...	...	...	20	...	54
Masaka	14	6,901	1,482	5,419	93	1,229	...	51	528	160	...	...	24	74	...	...	...	...	...	...	...	...
Mubendi	19	12,639	3,603	9,036	455	2,723	5	2	299	215	...	129	15	150	60	...	76	1	...	...	63	41
TOTAL ...	134	68,501	24,572	43,929	1,266	15,890	8	273	7,410	7,843	...	339	948	2,479	318	...	406	6	...	43	66	146
EASTERN:—																						
Busoga	19	18,405	4,453	13,952	65	3,079	...	7	447	300	...	...	383	165	...	...	160	...	...	10	...	230
TOTAL ...	19	18,405	4,453	13,952	65	3,079	...	7	447	300	...	...	383	165	...	...	160	...	...	10	...	230
NORTHERN:—																						
Masindi	23	15,198	3,186	12,012	571	1,990	68	25	1,323	79	...	1	52	...	802	...	267	...	...	...	...	116
Hoima	2	1,350	589	761	34	540	...	...	100	...	...	...	...	...	...	...	30	...	...	...	...	117
TOTAL ...	25	16,548	3,775	12,773	605	2,530	68	25	1,423	79	...	1	52	...	802	...	297	...	...	...	...	233
WESTERN:—																						
Toro	26	14,935	2,393	12,542	413	1,144	4	60	...	...	25	...	...	...	...	62	20	...	8	...	2	50
TOTAL ...	26	14,935	2,393	12,542	413	1,144	4	60	...	...	25	...	...	...	...	62	20	...	8	...	2	50
GRAND TOTAL	204	118,389	35,193	83,196	2,349	22,643	80	365	9,280 (i)	8,222 (ii)	25	340	1,383 (iii)*	2,644 (iv)*	1,120	62	883	6	8	53	68	659

(i) 7,505 acres interplanted with Coffee.
(ii) 5,104 „ „ „ „
(iii) 1,048 „ „ „ Para.
(iv) 423 „ „ „ „

* Under shade.

Appendix 4.

Live Stock on European Plantations.

Province	Oxen	Cows	Mules	Donkeys	Sheep	Goats	Pigs
Buganda ...	373	642	4	...	103	152	89
Eastern ...	116	39	...	...	...	87	12
Northern ...	19	28	2	...	22	20	...
Western ...	84	148	1	6	84	10	...
Totals ...	592	857	7	6	209	269	101

Appendix 5.

Mission Agriculture—Cultivation.

Province.	Coffee *Arabica*	Coffee *Robusta*	Para Rubber	Other Rubbers	Cacao	Cotton
	Acres.					
Buganda	480	26	350	115	125	154
Eastern	61	...	...	5	4	100
Northern	142	...	...	...	20	31
Western	26	...	...	4	...	...
Totals	709	26	350	124	149	285

Appendix 6.

Indian Agriculture.

Compiled from Returns of 16 Plantations.

Province and District.	Number of Estates.	Total Acreage taken up.	Total Acreage under Cultivation.	Total Acreage not Cultivated.	Acreage of Coffee (*Arabica*).		Acreage of Coffee (*Robusta*).		Acreage of Para Rubber.		Acreage of other Rubbers.		Acreage of Cacao.		Cotton.	Wheat	Sugar.	Tobacco.	Maize.	Miscellaneous Crops.
					Under 2 years.	Over 2 years.	Under 2 years.	Over 2 years.	Under 5 years.	Over 5 years.	Under 5 years.	Over 5 years.	Under 5 years.	Over 5 years.						
Buganda:—																				
Mengo	7	4,096	1,440	2,656	125	1,035	...	75	50	475	...	...	...	160	60	...	158	...	80	30
Entebbe	3	684	440	244	20	60	...	5	235	160	...	...	30	2	...	...	...	...	...	10
Mubendi	5	1,976	645	1,331	165	380	...	...	20	20	...	...	..	15	30	...	80	...	...	10
Total ...	15	6,756	2,525	4,231	310	1,475	...	80	305	655	...	...	30	177	90	...	238	...	80	50
Eastern:—																				
Busoga	1	995	80	915	80	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Total ...	1	995	80	915	80	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Grand Total	16	7.751	2,605	5,146	390	1,475	...	80	305 (i)	655 (ii)	...	...	30	177 (iii)	90	...	238	...	80	50

(i) Interplanted with 90 Acres Coffee
(ii) „ „ 465 „ „
(iii) „ „ 60 „ Para.

IMPERIAL INSTITUTE OF THE UNITED KINGDOM, THE COLONIES AND INDIA.

Report on Coffee from Uganda.

The thirteen samples of coffee which are the subject of this report were forwarded to the Imperial Institute by the Acting Director of Agriculture and are referred to in his letter No. 886/302 II dated the 6th December, 1919.

The coffee was stated to have been grown on the Government Plantation at Kampala.

Description.

The samples consisted of ungraded coffee in the parchment, eight samples being described as *Coffea excelsa* and five as *C. robusta*. Their characteristics are given in the following table, together with the results of their examination at the Imperial Institute:—

No.	Label.	Weight of sample in ozs.	Description.	Percentage of parchment in berries.	Average weight of beans in grams.	Size of beans.
1	*Coffea excelsa* ... Tree No. 17. Pylendel No. 1.	17	Seed coat brownish-green and tightly adhering; bean slightly greenish cream and opaque.	29	0·27	Fairly large.
2	*Coffea excelsa* ... Tree No. 11. Pylendel No. 2.	2¾	Seed coat as in No. 1 but greener, and tightly adhering; bean slightly greenish cream and opaque.	33	0·14	Small.
3	*Coffea excelsa* ... Tree No. 15. Pylendel No. 1.	3¼	Seed coat greenish-brown and tightly adhering; bean slightly greenish cream but less green than Nos. 1 or 2, and opaque.	36	0·25	Fairly large.
4	*Coffea excelsa* ... Tree No. 10. Pylendel No. 1.	3½	Seed coat brownish-green and tightly adhering; bean cream coloured and opaque.	27	0·24	Fairly large.
5	*Coffea excelsa* ... Tree No. 12. Pylendel No. 2.	3¼	Seed coat brownish-green and tightly adhering; bean cream coloured and opaque.	28	0·33	Large.
6	*Coffea excelsa* ... Tree No. 11. Pylendel No. 2.	7¼	Seed coat greenish-brown and tightly adhering; bean yellowish-cream and opaque.	22	0·20	Medium.
7	*Coffea excelsa* ... Tree No. 16. Pylendel No. 1.	2¾	Seed coat greenish-brown and tightly adhering; bean cream coloured and opaque.	31	0·32	Large.
8	*Coffea excelsa* ... Tree No. 5. Pylendel No. 1.	3¼	Seed coat brownish-green and tightly adhering; bean greenish-cream and opaque.	29	0·27	Fairly large.
9	*Coffea robusta* ...	11¾	Seed coat light brown and loosely adhering; bean greyish-cream and translucent.	19	0·11	Small.
10	*Coffea robusta* ... Bwamba type. Tree No. 4.	8¼	Seed coat light brown and loosely adhering; bean greyish-cream and opaque.	24	0·08	Very small.
11	*Coffea robusta* ... Bwamba type. Tree No. 1.	6¼	Seed coat light brown and loosely adhering; bean greyish-cream and translucent.	19	0·10	Small.
12	*Coffea robusta* ... Bwamba type. Tree No. 2.	4	Seed coat light brown and loosely adhering; bean greyish-cream and translucent.	21	0·08	Very small.
13	*Coffea robusta* ... Quilou. Tree No. 1.	5	Seed coat a darker brown and more tightly adhering than in Nos. 9 to 12; bean cream coloured and very opaque.	14	0·14	Small.

Commercial Valuation.

The coffees were forwarded for examination and liquoring trials to a firm of brokers in London, who classified Nos. 1 to 8 as "Liberian" coffees which are usually not saleable in the United Kingdom, although there is at times a good demand for the better grades of such coffee in certain other countries. They assigned the following values to these eight samples (May, 1920):—

Sample.	Description.	Value in London per cwt.
1.	Good, even brown greenish; fair size	110s.
2.	Very small, green; unripe	75s.
3.	Very rough, ugly, greenish; good size	83s.
4.	Rough, very green, unripe, coated; medium size	95s.
5.	Bold, rough, dull, very green; unripe appearance	100s.
6.	Peaberry, mixed with a few flats, rather small, rough, dull; coated greenish	90s.
7.	Good, boldish, greenish, rather coated	110s.
8.	Good, boldish, very green; less desirable	105s.

The firm regarded samples Nos. 9 to 13 as unattractive and undesirable, although in their opinion No. 9 was superior to the other samples, and No. 13 might be saleable as a low-priced coffee either for the United Kingdom market or for export to other countries. The firm estimated the value of these coffees as follows (May, 1920) :—

Sample.	Description.	Value in London. per cwt.
9.	Fair quality, small beans; green.	95s.
10.	Greenish, very small end very nipped; mixed, some broken	78s.
11.		80s.
12.		75s.
13.	Ordinary, rather uneven, small, pale, mixed with many brown coated beans.	95s.

Another firm who were consulted by the Imperial Institute also described samples Nos. 1 to 8 as Liberian coffees of different grades. They considered that their nominal value (June, 1920) would be about 75s. to 100s. per cwt., London landed terms, although it would be difficult to sell some of the coffees unless they were of better appearance. They suggested that the berries had been picked in an unripe condition. The firm stated that samples Nos. 9 to 13 represented grades of Robusta coffee which would have values of 75s. to 95s. per cwt. in London (June, 1920) and would also be saleable on the Continental markets.

The valuations given above are for the beans after husking, as it is usual for coffee to be cleaned in the country of origin.

Remarks.

These coffees would probably be difficult to dispose of in the United Kingdom market. Liberian coffees are only brought to this country for re-exportation and although there is at times a good demand for the better grades, the export trade is stated to be stagnant at the present time. A demand might perhaps be found at a low price either in the United Kingdom or on the Continent for the Robusta coffees represented by Nos. 9 to 13.

31st July, 1920.

Appendix 8.

IMPERIAL INSTITUTE OF THE UNITED KINGDOM, THE COLONIES AND INDIA.

Report on Coffee from Uganda.

The sample of coffee which is the subject of this report was forwarded to the Imperial Institute by the Acting Director of Agriculture and is referred to in his letter No. 635/302 dated the 8th September, 1919.

The coffee was described as *Coffea eugenioides* (?) and was stated to have been grown on the Government Plantation at Kampala.

Description of Sample.

The sample, which weighed 2¼ lbs., consisted of very small ungraded coffee beans in the parchment, and was similar to the previous sample of *Coffea eugenioides* (?) forwarded from Kampala (*see* Imperial Institute Report dated 26th June, 1918). The parchment had a dull straw colour and was in many cases slightly split; the beans appeared translucent and were of light greyish-cream tint.

The berries consisted of parchment 16 per cent, and beans 84 per cent. The average weight of a single bean was 0·043 gram.

Results of Examination.

The beans were chemically examined at the Imperial Institute with the following results which are shown in comparison with those recorded for *C. arabica* :—

	Present sample. per cent.	*C. arabica*. per cent.
Moisture	3·4	8 to 12
Total nitrogen	1·77	1·1 to 2·2
Caffeine	0·50	0·8 to 1·8
Ash	2·7	3·5 to 4·0

These results show that this coffee resembles that of *C. arabica* in the percentage of total nitrogen but that it contains an exceptionally low proportion of caffeine and yields a comparatively small amount of ash.

Commercial Valuation.

A sample of the coffee was forwarded for roasting trials to experts who reported that the beans were very small and light, and that only about one half of them appeared to be mature.

The roasted beans were of fairly even quality, the ripe beans being of bright appearance, whilst the immature beans were pale and of poor aroma, but less so than was expected from their appearance in the raw state.

The liquor was described as pure and entirely free from undesirable flavours, although the strength was not very good, probably owing to the presence of the immature beans. It was considered that the purity of the liquor would make the coffee particularly acceptable on the United Kingdom market.

The present value of the coffee in London was regarded as about 100s. to 105s. per cwt., which is approximately double the price it would have realised in normal times.

Remarks.

This coffee is of promising quality but the berries are very small and the sample contained a large proportion of immature beans of unsatisfactory colour. If the latter defect were remedied the coffees should be readily saleable in the United Kingdom.

13th March, 1920.

Appendix 9.

DEPARTMENT OF AGRICULTURE, KABETE.

The Hon. Acting Director of Agriculture,
Through The Manager, Kabete Farm.

Sir,

Report on Flax grown by Mr. Grey, Busoga.

I have the honour to acknowledge receipt of your No. 27/80 of the 26th ultimo and to reply as follows:—

At present time there is little or no market for Flax in B. E. A. All E. A. Flax Growers ship their own fibre either through Shipping Agents or through Bankers who give advances on the Flax Fibre when on rail.

Price.—Judging from similar samples of Flax sent home during the earlier part of the year and the prices obtained for East African Flax, I should say this sample of Fibre, in bulk, would fetch about £250 per ton and £120 per ton for tow.

The quality of Fibre obtained from the straw is fair in comparison with East Africa Flax. I am certain that with careful planting, handling, harvesting and preparation of the Flax straw for Fibre, both the quality and quantity of Flax Fibre could be increased.

28th August, 1919.

Appendix 10.

DEPARTMENT OF AGRICULTURE, NAIROBI.

The Director of Agriculture,
Kampala, Uganda.

Sir,

Re: **Sample of Flax submitted for Report.**

Reference your No. 202/301 of 13th April. I have the honour to forward the appended report, made by the Government Flax Instructor, on the sample of hand-prepared flax grown by Mr. Maling on his estate at Fort Portal and submitted by you on the 13th April.

"Both samples are much smaller than should be sent for report.

No. 1.—This unretted sample of fibre appears to be well grown with plenty of length and strength and if properly retted and scutched, would turn out a good average sample of fair quality.

No. 2.—Apparently an attempt at retting this sample has been made, which process has been allowed to go on too long, resulting in a very weak and dry fibre, and practically useless for spinning. This sample too seems well grown, but as in No. 1 the reed has been badly broken in separating the shieve from the fibre.

When harvesting, get the straw well out of the sun into small stacks or "shoigs" as soon as the dryness of the stalks will permit."

4th May, 1920.

Appendix 11.

IMPERIAL INSTITUTE OF THE UNITED KINGDOM, THE COLONIES AND INDIA.

Report on Pennisetum Grass from Uganda.

The sample of Pennisetum grass from Uganda which is the subject of this report was forwarded to the Imperial Institute by the Acting Director of Agriculture and is referred to in his letter No. 801/517 dated 24th October, 1919.

The grass was stated to have been raised from seed collected from specimens growing in a savannah near Entebbe, and it is desired to ascertain its value as a fodder.

Description of Sample.

The sample weighed 12 oz. and consisted of plants of pale greenish straw colour, from 26 to 45 inches long and bearing immature seed heads.

A specimen of the grass was forwarded by the Imperial Institute to the Royal Botanic Gardens, Kew, where it was identified as *Pennisetum polystachyon*, Schult.

Results of Examination.

The grass as received contained 7·4 per cent of moisture. It was examined with the following results, which are expressed on the moisture-free material, in comparison with the corresponding figures recorded for Elephant grass (*P. purpureum*) Timothy grass, alfalfa, and ordinary pasture grass :—

Present Sample. (*P. polystachyon*).		Elephant Grass. (*P. purpureum*).		Timothy Grass.	Alfalfa.	Pasture Grass.
per cent.		(1) per cent	(2) per cent	per cent.	per cent.	per cent.
Crude proteins	9·9	10·5	7·6	8·1	17·0	17·5
Fat	2·7	1·5	0·8	3·1	3·5	4·0
Carbohydrates	38·6	41·4	45·3	52·6	43·7	48·5
Fibre	40·1	38·8	38·7	30·7	26·2	20·0
Ash	8·7	7·8	7·6	5·5	9·6	10·0
Nutrient ratio	1 : 4·5	1 : 4·3	1 : 6·2	1 : 7·4	1 : 3·0	1 : 3·3
Food units	70	71	66	81	95	102

The sample was found to be free from cyanogenetic glucosides.

It will be seen from these figures that the *Pennisetum polystachyon* grass from Uganda contains a slightly higher percentage of protein than that present in Timothy grass; it also compares satisfactorily in this respect with *P. purpureum*, but is inferior to alfalfa and pasture grass.

Remarks.

The results of this investigation show that *Pennisetum polystachyon* is of satisfactory composition as a fodder and closely resembles *P. purpureum* (Elephant Grass or Nappier's Fodder). It may be mentioned that other species of Pennisetum are stated to be of value for fodder, including *P. longistylum* (Kikuyu Grass) of British East Africa and *P. ciliare* and *P. dichotomum* of Somaliland.

19th April, 1920.

Appendix 12.

IMPERIAL INSTITUTE OF THE UNITED KINGDOM, THE COLONIES AND INDIA.

Report on Sweet Potato Products from Uganda.

The samples of sweet potato starch, meal and flour which are the subject of this report were forwarded to the Imperial Institute by the Acting Director of Agriculture, and are referred to in his letters No. 636/517 dated the 8th September, and No. 681/517 dated the 19th September, 1919.

The materials were stated to have been prepared from sweet potatoes grown at the Government Plantation, Kampala, and it was desired to ascertain their food value.

Description of Samples.

The materials received at the Imperial Institute consisted of ten 1 lb. samples of starch, nine 1 lb. samples of meal and one 3 lb. sample of flour. They had the following characters:—

Number.	Starches.	Meals.
1	Dull greyish-white	Light sandy brown.
2	Greyish-white	Buff (*i.e.*, lighter than No. 1).
3	do.	do. do.
4	do.	Light sandy brown.
5	Dull greyish-white	do.
6	Greyish-white	do.
7	do.	(No sample 7 of meal was received)
8	do.	Light brown.
11	do.	Buff.
12	Lighter greyish-white than other samples	Light buff.

The starches were lumpy powders, devoid of taste, and the meals were coarse products with a sweet, rather insipid flavour.

Flour.—This sample, which was labelled "Sample of flour from J. Litos, Canadian Bakery, River Road, Nairobi", was a cream coloured flour, of fine texture and good appearance. It was odourless but had a slightly sweet taste.

Results of Examination.

Representative samples of the starches were analysed at the Imperial Institute with the following results:—

	No. 1. per cent.	No. 3. per cent.	No. 12. per cent.
Moisture	11·9	12·5	12·6
Crude protein	0·7	0·7	0·8
Fat	0·2	0·1	0·1
Starch (by acid hydrolysis)	80·9	81·2	81·5
Other carbohydrates	5·7	4·8	4·4
Fibre	0·1	0·1	0·1
Ash	0·5	0·6	0·5
Matter soluble in cold water (less ash of same)	1·8	1·5	2·5

Samples representative of the meals, and the sample of flour were also analysed with the results shown in the following table, to which are added for comparison figures obtained at the Imperial Institute for banana, yam and cassava flour:—

	Sweet potato meals.			Sweet potato flour.	Banana flour.	Yam flour.	Cassava flour.
	No. 3 per cent.	No. 8 per cent.	No. 12 per cent.	per cent.	per cent.	per cent.	per cent.
Moisture	8·5	8·8	9·8	11·0	12·0	12·5	12·4
Crude protein	8·8	7·9	5·6	7·5	4·6	6·0	3·8
Fat	0·6	1·0	0·8	0·9	0·6	0·3	0·9
Starch	64·9*	62·7*	70·7*	72·4*	79·6†	78·5†	73·2*
Other carbohydrates	13·1	14·4	8·7	7·7			7·2
Fibre	1·8	2·2	2·0	0·1	0·7	1·4	1·3
Ash	2·3	3·0	2·4	0·4	2·5	1·3	1·2
Matter insoluble in cold water (less ash of same)	22·5	23·8	17·8	7·7	—	—	—
Acidity	trace	trace	trace	nil	—	—	—
Nutrient ratio	1 : 9·0	1 : 10·1	1 : 14·5	1 : 10·9	1 : 17·6	1 : 13·2	1 : 21·9
Food units	102	99	95	101	93	94	92

* By acid hydrolysis.
† By difference.

Remarks.

Starches.—Of the three samples analysed No. 1 was taken as being the darkest of the starches and No. 12 palest, whilst No. 3 represents the majority of the samples which were of an intermediate shade. The analyses showed that these three samples were practically identical in composition. The percentages of starch were good and on the whole the samples were of fairly high purity. Their colour would probably render them unsaleable in the United Kingdom for use of foodstuffs, but they could no doubt be utilised for technical purposes.

Flour and Meals.—The flour was of good appearance and would probably find a market in the United Kingdom, but the coarse, coloured meals would be more difficult to dispose of.

The analyses show that the flour was practically free from fibre, and that both meals and flour had high nutritive values and contained a higher percentage of protein than banana and cassava flour, and except in the case of sample No. 12, than yam flour.

Sweet potato flour is at present quoted in London at 28s. per cwt.

In the event of supplies of these products becoming available for export from Uganda, information should be furnished to the Imperial Institute as to the quantities which could be offered and the price.

4TH JUNE, 1920.

Appendix 13.

IMPERIAL INSTITUTE OF THE UNITED KINGDOM, THE COLONIES AND INDIA.

Report on "Calabash-Nutmeg" Seeds from Uganda.

The sample of "calabash-nutmeg" seed (*Monodora Myristica*, Dun.) which is the subject of this report was forwarded to the Imperial Institute by the Acting Director of Agriculture and is referred to in his letter No. 1412/517 dated the 30th December, 1918. It was stated that the seeds had been obtained from a tree grown in the Botanic Gardens at Entebbe.

Description of Sample.

The sample weighed 2 lbs. and consisted of clean seeds in good condition which were identical with samples of "Oware" seed (*Monodora Myristica*) from the Gold Coast previously examined at the Imperial Institute.

Results of Examination.

The seed was submitted to chemical examination at the Imperial Institute in comparison with the samples of Owere seed from the Gold Coast previously examined, and the results are shown in the following table:—

	Present sample.	Previous samples from the Gold Coast.	
	per cent.	per cent.	per cent.
		(1)	(2)
Yield of volatile oil from seed as received ...	3·2	2·2	5·9
Yield of fixed oil from seed as received ...	36·4	35·0	36·0
Constants of volatile oil:—			
Specific gravity at 15°/15°C	0·85	0·8592	0·849
Optical rotation & D	*70·75°	—57·8°	—44·7°
Acid value	1·2	1·4	1·2
Ester value, before acetylation	3·3	6·4	1·9
Ester value, after acetylation	*	33·5	52·9
Solubility in 90% alcohol	Soluble in 3·6 vols.	Soluble in 4·5 vols.	Soluble in 6 vols.

* Not enough oil was obtained to allow of this determination.

The volatile oil was pale yellow and had an agreeable odour resembling that of the volatile oil obtained from the Gold Coast.

The fixed oil extracted from the residue after the removal of the volatile oil by steam distillation, was examined with the following results:—

	Present sample.	Previous samples from the Gold Coast.	
		(1)	(2)
Specific gravity at 15°/15°C	0·918	0·917	0·919
Acid value	54·4	56·7	20·2
Saponification value	186·5	180·6	186·7
Iodine value, per cent	122·4	110·6	118·4

The fixed oil was reddish-brown and possessed the odour of the volatile oil, traces of which were no doubt present in it.

Remarks.

In comparing the results of the examination of these samples of *Monodora Myristica* seed, it would appear that the quantity of volatile oil which they furnish is subject to considerable variation (from 2·2 to 5·9 per cent.), but that the yield of fixed oil is fairly constant (35·0 to 36·4 per cent.). It is remarkable that the volatile oil obtained from the Uganda seeds is dextrorotatory whereas the oils from the Gold Coast seeds investigated at the Imperial Institute and also those examined by previous observers were all laevorotatory. With the exception of this peculiarity, the characters of both the volatile oil and the fixed oil from the three samples of seed agree fairly well.

The results of the previous investigation at the Imperial Institute of Monodora seeds from the Gold Coast (*see* "Bulletin of the Imperial Institute," Vol. XIII (1915), No. 3, pages 346-350) showed (1) that the volatile oil was of low value, (2) that the fixed oil was not likely to be readily saleable, and (3) that the exploitation of the seeds was unlikely to be remunerative so long as other and better oil seeds were available at cheap rates. The values of all oil seeds and oils have advanced very considerably since the date of the earlier investigations, but it still seems unlikely that the *Monodora Myristica* seeds would meet with a ready market at remunerative prices.

27TH AUGUST, 1919.

Appendix 14.

Comparative Statement of Exports from Uganda Protectorate for the Year ended 31st March, 1920.

ARTICLES.	Unit.	From 1st Apr., 1919 to 31st Mar., 1920.		From 1st Apr., 1918 to 31st Mar., 1919.		INCREASE.		DECREASE.	
		Quantity	£	Quantity	£	Quantity	£	Quantity	£
Cotton, Ginned	cwts.	130,464	1,209,663	98,188	965,951	32,276	243.712	...	...
Coffee, Husked	„	54,694	156,668	50,460	102,658	4,255	54,010	...	...
„ in Parchment	„	4,266	5,046	3,851	3.351	415	1,695	...	...
Rubber, Wild	lbs.	2 089	90	14,262	620	...	...	12,173	530
„ Plantation	„	388,523	25,902	253,063	12,893	135,460	13.009	...	...
Cacao	cwts.	660	1,231	209	331	451	900	...	...
Chillies	„	5,153	10,251	5,487	6,847	...	3,404	334	...
Ground Nuts	„	1,135	1,388	896	562	239	826	...	...
Cotton Seed	„	105,457	25,783	33,223	6,149	72,234	19,634	...	...
Castor Oil Seed	„	8,518	1,443	737	468	7,781	975	...	...
Simsim Seed	„	23,384	30,697	939	1,008	22,445	29,689	...	...
Simsim Oil	„	102	470	27	99	75	371	...	...
Cotton Seed Oil	„	335	876	448	837	...	39	113	...
Ghee (Clarified Butter)	„	3,196	15,303	6,443	26,122	...	...	3,247	10,819
Jaggery (Unrefined Sugar) ...	„	432	520	2	3	430	517	...	...
Hides and Calf Skins	„	52,171	242,238	15,053	64,125	37,118	178,113	...	...
Skins, Goat	„	4.200	27,870	1,948	8,162	2,252	19,708	...	...
„ Sheep	„	95	360	19	15	76	345	...	...
„ Miscellaneous	lbs.	95	9	280	29	...	...	185	20
Hippo Teeth	„	12,891	1,074	3,265	261	9,625	813	...	...
Horns	„	327	250	129	9	198	241	...	...
Ivory	„	161,091	65,952	94,795	37,918	66,296	28,034	...	...
Timber	cwts.	1,975	1,311	3,040	1,939	...	...	1,065	628
Animals, Living	No.	3	3	417	1,985	...	...	414	1,982
Miscellaneous Produce	value.	...	3,395	...	2,835	...	560	...	...
Goods, Manufactured, unenumerated	„	...	694	...	2.220	...	...	...	1,526
Goods, Unmanufactured, „	„	...	50	...	60	...	...	...	10
TOTALS	...	...	1,828.537	...	1,247,457	...	596,595	...	15,515

Net increase £581,080.

Comparative Statement of Exports from the Uganda Protectorate.

Articles.	Unit.	Year ended 31st March, 1916.		Year ended 31st March, 1917.		Year ended 31st March, 1918.		Year ended 31st March, 1919.		Year ended 31st March, 1920.	
		Quantity.	£	Quantity.	£	Quantity.	£	Quantity.	£	Quantity.	£
Cotton, Ginned	cwts.	91,231	239,483	77,961	348,880	99,395	537,083	98,188	965,951	130,464	1,209,663
„ Unginned	„	8,110	5,943	32	34	282	548	—	—	—	—
Coffee, Husked	„	8,691	22,714	31,136	81,323	15,362	33,278	50,460	102,658	54,694	156,668
„ Parchment	„	34,547	64,488	17,473	32,616	4,485	6,283	3,851	3,351	4,266	5,046
Rubber, Wild	lbs.	5,488	554	400	40	9,362	923	14,262	620	2,089	90
„ Plantation	„	52,304	4,362	71,995	5,856	144,727	9,965	253,063	12,893	388,523	25,902
Silk, Raw	„	—	—	2,100	70	900	100	—	—	—	—
Cacao	cwts.	—	—	258	562	114	138	209	331	660	1,231
Chillies	„	8,333	16,850	13,317	27,328	9,287	18,586	5,487	6,847	5,153	10,251
Ground Nuts	„	1,693	822	3,640	1,767	954	464	896	562	1,135	1,388
Cotton Seed...	„	104,498	9,760	109,213	10,220	44,021	7,402	33,223	6,149	105,457	25,783
Castor Seed...	„	—	—	—	—	329	171	737	468	8,518	1,443
Simsim Seed	„	39,261	21,986	38,090	21,318	17,337	13,048	939	1,008	23,384	30,697
„ Oil	„	134	250	387	725	230	530	27	99	102	470
Cotton Seed Oil	„	725	870	—	—	—	—	448	837	335	876
Beeswax	„	—	2	—	—	—	—	—	—	—	—
Ghee (Clarified Butter)...	„	4,591	11,999	7,007	18,310	7,090	23,270	6,443	26,122	3,196	15,303
Jaggree (Unrefined Sugar)	„	551	329	520	310	851	668	2	3	432	520
Hides and Skins	„	18,211	64,480	19,131	52,693	22,634	76,707	15,053	64,125	52,171	242,238
Skins, Goat	„	391,290*	18,260	398,448*	16,095	2,273	6,789	1,948	8,162	4,200	27,870
„ Sheep	„	10,144*	169	9,380*	126	46	41	19	15	95	360
„ Calf	„	612	2,227	127	345	--	—	—	—	—	—
„ Miscellaneous	lbs.	—	—	—	—	106	10	280	29	95	9
Horns	„	12	4	44½	15	40	1	129	9	327	250
Hippo Teeth	„	2,818½	251	4,800½	422	2,336	156	3,265	261	12,891	1,074
Ivory	„	30,641	11,091	22,876	8,778	109,426½	43,770	94,795½	37,918	161,091	65,952
Timber	cwts.	419	154	533	567	778	411	3,040	1,939	1,975	1,311
Animals, Living	No.	1,179	3,467	1,865	6,131	41	118	417	1,985	3	3
Miscellaneous Produce...	value.	—	2,102	—	1,371	—	2,331	—	2,835	—	3,395
Goods, Manufactured, unenumerated ...	„	—	803	—	1,450	—	1,892	—	2,220	—	694
Goods, Unmanufactured, unenumerated ...	„	—	261	—	443	—	10	—	60	—	50
Grand Totals ...	...	—	503,681	—	637,795	—	784,693	—	1,247,457	—	1,828,537

*Number.

Comparative Statement of Exports—the Produce of the Uganda Protectorate—showing Quantities and Values from the various Ports and Stations, for the Years ended 31st March, 1919 and 1920.

ARTICLES.	Unit.	BUKAKATA.				ENTEBBE.				KAMPALA.				KIBANGA.			
		Year ended 31-3-20.		Year ended 31-3-19.		Year ended 31-3-20.		Year ended 31-3-19.		Year ended 31-3-20.		Year ended 31-3-19.		Year ended 31-3-20.		Year ended 31-3-19.	
		Quantity.	£	Quantity.	£	Quantity.	£	Quantity.	£	Quantity.	£	Quantity.	£	Quantity.	£	Quantity.	£
Cotton, Ginned	Cwts.	2	16	13	38	21	163	70*	6	39,853	374,942	25,938	256,246	...	...	....	....
„ Unginned	„	....	...	...	...	...	...	...	...	...	...	...	...	...	...	....	....
Coffee, Husked	„	521	1,483	315	570	112	321	2,158	4,465	28,473	80,676	27,046	56,436	15,053	43,439	18,234	35,375
„ Parchment	„	....	...	...	...	408	477	...	...	1,499	1,810	1,717	1,604	258	304	....	....
Rubber, Wild	Lbs.	...	...	...	...	1,855	80	...	...	...	...	...	...	...	...	....	....
„ Plantation	„	....	...	...	...	35,588	2,373	22,316	1,111	157,419	10,495	110,716	5,220	34,178	2,278	18,796	1,169
Silk, Raw	„	....	...	...	...	...	...	...	...	...	...	...	...	...	...	....	....
Cacao	Cwts.	....	...	...	...	81	151	24	39	136	253	79	122	352	658	66	96
Chillies	„	29	55	6	9	4	9	11	12	531	1,040	1,391	1,752	...	...	....	....
Ground Nuts	„	58	70	...	...	...	...	...	...	277	339	82	104	...	...	....	....
Cotton Seed	„	...	...	220	33	1,700	424	..	...	52,202	12,601	5,804	1,016	...	...	....	....
Castor Oil Seed	„	....	...	...	...	...	...	...	...	8,518	1,443	737	468	...	...	....	....
Simsim Seed	„	37	48	...	...	...	...	...	...	2,083	2,643	...	...	...	...	....	....
„ Oil	„	....	...	...	...	49	228	...	...	16	76	...	...	...	..	....	....
Cotton Seed Oil	„	....	...	...	...	...	...	...	...	335	876	448	837	...	...	....	....
Ghee (Clarified Butter)	„	1,276	6,052	3,369	13,709	1	7	29	108	1,482	7,148	2,639	10,721	...	...	....	....
Jaggree (Unrefined Sugar)	„	....	...	...	...	1	1	...	...	60	68	...	...	...	...	...	....
Hides and Calf Skins	„	12,546	59,152	1,555	6,541	54	258	...	...	21,130	97,675	7,625	32,879	...	...	....	....
Skins, Goat	„	113	896	27	120	...	...	...	...	1,763	12,044	786	3,371	...	...	....	....
„ Sheep	„	....	...	...	...	...	...	...	...	73	272	...	...	...	...	....	....
„ Miscellaneous	Value	....	...	...	...	...	...	...	8	...	7	230	21	...	...	....	....
Hippo Teeth	Lbs.	....	...	124	6	...	...	...	...	2,037	169	772	64	...	...	....	....
Horns	„	....	...	...	...	...	...	...	...	...	...	...	...	...	...	....	....
Ivory	„	....	...	4,345	1,737	1,993	917	358	143	114,436	46,462	70,519	28,209	...	.	....	....
Timber	Cwts.	235	157	63	39	749	495	374	243	156	104	1,655	1,034	...	...	....	....
Miscellaneous Produce	Value	...	614	...	1,066	...	184	...	29	...	1,693	...	1,007	...	...	....	....
Goods Manufactured, unenumerated	„	...	165	...	817	...	42	...	29	...	242	...	855	...	...	....	....
Goods Unmanufactured, „	„	...	5	...	8	...	2	...	5	...	18	...	14	...	..	....	....
Animals, Living	No.	....	...	334	1,720	...	...	...	...	...	...	75	257	...	...	...	....
GRAND TOTALS		...	68,713	...	26,413	...	6,132	...	6,198	...	653,096	...	402,237	...	46,679	....	36,640

*lbs.

Comparative Statement of Exports—the Produce of the Uganda Protectorate—showing Quantities and Values from the various Ports and Stations, for the Years ended 31st March, 1919 and 1920.—*continued.*

Articles.	Unit.	Jinja.				Mjanji.				Other Ports and Stations.				Totals.			
		Year ended 31-3-20.		Year ended 31-3-19.		Year ended 31-3-20.		Year ended 31-3-19.		Year ended 31-3-20.		Year ended 31-3-19.		Year ended 31-3-20.		Year ended 31-3-19.	
		Quantity.	£	Quantity.	£	Quantity.	£	Quantity.	£	Quantity.	£	Quantity.	£	Quantity.	£	Quantity.	£
Cotton Ginned ...	Cwts.	54,865	507,532	51,082	502,379	11,213	110,727	1,608	15,426	24,510	216,283	19,547	191,856	130,464	1,209,663	98,188	965,951
„ Unginned ...	„	...	...	...	...	...	...	...	...	..	...	...	...	...	...	...	...
Coffee, Husked ...	„	4,296	12,615	1,675	3,527	62	195	89	173	6,177	17,939	943	2,112	54,694	156,668	50,460	102,658
„ Parchment ...	„	1,733	2,024	1,862	1,579	308	365	272	168	60	66	...	..	4,266	5,046	3,851	3,351
Rubber, Wild ...	Lbs.	234	10	14,262	620	...	...	...	...	...	...	...	..	2,089	90	14,262	620
„ Plantation ...	„	157,350	10,490	101,235	5,393	...	...	...	...	3,988	216	...	...	388,523	25,902	253,063	12,893
Silk, Raw ...	„	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Cacao ...	Cwts.	91	169	40	74	...	...	...	...	...	...	...	...	660	1,231	209	331
Chillies ...	„	4,558	9,088	4,060	5,050	6	12	...	...	25	47	19	24	5,153	10,251	5,487	6,847
Ground Nuts ...	„	734	900	148	71	66	79	160	141	..	...	506	246	1,135	1,388	896	562
Cotton Seed ...	„	33,425	8,282	21,749	4,212	164	42	...	...	17,966	4,434	5,450	888	105,457	25,783	33,233	6,149
Castor Oil Seed ...	„	...	...	...	...	...	...	...	...	...	...	...	...	8,518	1,443	737	468
Simsim Seed ...	„	18,446	24,159	326	365	702	920	...	...	2,116	2,927	613	643	23,384	30,697	939	1,008
„ Oil ...	„	37	166	12	44	...	...	15	55	...	...	...	...	102	470	27	99
Cotton Seed Oil ...	„	...	...	...	...	...	...	...	...	...	...	...	...	335	876	448	837
Ghee (Clarified Butter)...	„	227	1,092	190	739	174	832	155	607	36	172	61	238	3,196	15,303	6,443	26,122
Jaggree (Unrefined Sugar)	„	371	451	2	3	...	...	...	...	...	...	..	...	432	520	2	3
Hides and Calf Skins ...	„	13,542	62,369	4,551	19,100	4,771	22,186	1,290	5,472	128	508	32	133	52,171	242,238	15,053	64,125
Skins, Goat ...	„	1,732	11,078	906	3,702	397	2,533	125	516	195	1,319	104	453	4,200	27,870	1,948	8,162
„ Sheep ...	„	21	83	19	15	1	5	...	...	...	...	...	...	95	360	19	15
„ Miscellaneous ...	Value	...	2	...	...	...	...	...	10	...	...	...	...	...	9	280	29
Hippo Teeth ...	Lbs.	3,935	328	2,211	183	6,723	560	...	...	196	17	158	8	12,391	1,074	3,265	261
Horns ...	„	...	...	120	4	...	...	...	...	327	250	9	5	327	250	129	9
Ivory ...	„	4,036	1,614	2,197½	879	19	11	...	..	40,607	16,948	17,376	6,950	161,091	65,952	94,795½	37,918
Timber ...	Cwts.	835	555	946	622	...	...	2	1	...	...	...	...	1,975	1,311	3,040	1,939
Miscellaneous Produce ...	Value	...	794	...	606	...	106	...	90	...	4	...	37	...	3,395	...	2,835
Goods Manufactured, unenumerated ...	„	...	16	...	58	...	...	...	6	...	229	...	455	...	694	...	2,220
Goods Unmanufactured, unenumerated ...	„	...	25	...	26	...	...	...	5	...	...	...	2	...	50	...	60
Animals, Living ...	No.	3	3	8	8	...	...	...	...	...	...	...	...	3	3	417	1,985
Grand Totals ...		...	653,845	...	549,259	...	138,573	...	22,660	...	261,499	...	204,050	...	1,828,537	...	1,247,457

Details of Exports from other Ports and Stations are as follows:—

Articles.	Unit.	MBULAMUTI		NAMASAGALI		MASINDI PORT		ATURA		KELLE		LALLI		BUGONDO		GOGONYO		KISUBI		SAMBWE		SANGAI		TOTALS	
		Quantity	£	Quantity.	£	Quantity.	£	Quantity.	£	Quantity.	£	Quantity.	£	Quantity.	£	Quantity.	£	Quantity.	£	Quantity.	£	Quantity.	£	Quantity.	£
Cotton, Ginned ...	Cwts.	6,954	61,692	...	...	...	...	...	...	...	...	10,568	94,654	5,811	49,039	...	...	...	...	1,177	10,898	...	...	24,510	216,283
Coffee, Husked ...	,,	...	...	...	...	6,177	17,939	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	6,177	17,939
,, Parchment ...	,,	...	...	...	...	60	66	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	60	66
Rubber, Plantation ...	lbs.	...	...	...	...	3,988	266	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3,988	266
Chillies ...	Cwts.	23	42	2	5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	25	47
Cotton Seed ...	,,	4,679	1,125	...	...	...	...	...	...	...	...	1,752	436	3,986	995	3,058	760	...	...	2,589	644	1,902	474	17,966	4,434
Simsim ...	,,	...	...	...	...	...	...	2,054	2,849	39	49	...	...	...	...	...	...	...	...	...	...	23	29	2,116	2,927
Ghee ...	,,	5	23	26	121	40 (lbs)	2	...	...	...	...	...	...	5	26	...	...	...	...	...	...	...	...	36	172
Hides and Calf Skins ...	,,	126	587	...	...	2	11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	128	598
Skins, Goat ...	,,	191	1,296	...	...	...	...	...	...	4	23	...	...	...	...	...	...	...	...	...	...	...	...	195	1,319
Ground Nuts ...	,,	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Ivory ...	lbs.	...	...	...	...	40,607	16,948	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	40,607	16,948
Horns ...	,,	...	...	...	...	327	250	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	327	250
Hippo Teeth ...	,,	...	...	...	...	196	16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	196	17
Miscellaneous Produce	Value	...	...	...	3	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4
Goods Manufactured, unenumerated ...	,,	...	5	...	...	...	9	...	...	...	...	...	...	...	...	...	...	...	215	...	...	...	...	...	229
Goods Unmanufactured, unenumerated ...	,,	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Totals...		...	64,770	...	129	...	35,508	...	2,849	...	72	...	95,090	...	50,060	...	760	...	215	...	11,542	...	503	...	261,499

N.B.—All Produce from the above Ports and Stations, except from Kisubi, passes through Jinja Port.

ENTEBBE METEOROLOGICAL STATEMENT FOR THE YEAR 1919.

Lat. 0° 4′ 31″ N. Long. 32° 28′ 30″ E. Height of Barometer above M. S. L. 3842 Feet.

MONTH.	At 7 A.M.				At 2 P.M.				At 9 P.M.								
	Barometer corrected and reduced to 32° F.	Attached Thermometer.	Dry Bulb.	Wet Bulb.	Barometer corrected and reduced to 32° F.	Attached Thermometer.	Dry Bulb.	Wet Bulb.	Barometer corrected and reduced to 32° F.	Attached Thermometer.	Dry Bulb.	Wet Bulb.	Maximum Temperature.	Minimum Temperature.	Sunshine.	Rainfall.	No. of days Rain fell.
1919.	In.	°	°	°	In.	°	°	°	In.	°	°	°	°	°	hrs. mts.	In.	
JANUARY	26·178	70·8	67·8	65·1	26·137	85·5	80·6	70·4	26·133	72·6	72·4	67·8	82·7	65·0	6-24	1·45	7
FEBRUARY	26·225	69·2	67·5	65·4	26·173	81·9	77·1	69·5	26·187	71·4	71·3	67·7	80·2	64·6	4-37	7·06	17
MARCH	26·199	72·8	68·5	66·5	26·163	83·2	78·3	71·1	26·159	72·2	71·7	68·2	80·5	65·9	4-23	9·00	17
APRIL	26·213	71·8	68·0	65·9	26·172	82·6	76·9	70·4	26·190	70·9	70·4	66·9	79·9	62·5	5-32	4·84	19
MAY	26·197	75·3	68·5	65·7	26·180	80·7	75·4	69·3	26·200	70·5	69·2	65·9	78·4	63·6	6-16	10·52	17
JUNE	26·241	70·1	66·7	64·1	26·218	81·3	75·6	68·1	26·234	68·9	68·4	64·7	77·3	63·2	6-11	5·97	11
JULY	26·237	66·4	64·6	62·6	26·216	77·5	72·0	67·2	26·237	67·0	65·9	63·3	75·2	61·6	4-37	7·72	16
AUGUST	26·238	64·5	64·8	62·5	26·213	80·3	76·0	68·8	26·237	66·9	66·1	63·3	78·0	66·0	5-54	2·70	11
SEPTEMBER	26·193	69·0	65·2	63·3	26·153	80·0	75·4	68·8	26·184	68·4	67·7	63·6	79·1	62·0	4-55	3·09	11
OCTOBER	26·178	73·9	67·9	65·0	26·143	82·1	77·6	70·8	26·184	70·0	69·6	66·9	80·8	63·3	6-40	3·55	15
NOVEMBER	26·176	72·6	68·5	64·9	26·138	82·1	76·9	70·2	26·169	67·7	70·6	67·4	77·5	62·2	4-31	2·97	9
DECEMBER	26·181*	71·5*	68·4*	65·4*	26·149*	82·3*	77·4*	66·6*	26·182*	68·3*	68·4*	65·2*	80·7*	62·0*	5-20†	1·53	6
																TOTAL	
MEAN FOR YEAR ...	26·205	70·7	67·2	64·7	26·171	81·6	76·7	69·3	26·192	69·6	69·3	65·9	79·2	63·5	5-27	60·40	156

*Records for 29 days.

†Records for 28 days.

Statement of Extra Meteorological Observations taken at Entebbe, for 1919.

MONTH.	Solar Radiation Thermometer.		Terrestrial Radiation Minimum Thermometer.
	Black Bulb. 2 P.M.	Bright Bulb.	
1919.	°	°	°
JANUARY	145·9	107·0	61·8
FEBRUARY	143·0	104·0	61·3
MARCH	122·0	100·4	62·6
APRIL	125·4	101·2	60·5
MAY	122·8	100·0	55·6
JUNE	118·9	97·4	51·4
JULY	115·8	94·4	55·4
AUGUST	117·6	98·2	53·0
SEPTEMBER	122·3	100·5	53·4
OCTOBER	126·4	102·6	61·4
NOVEMBER	128·7	103·2	58·2
DECEMBER (3)	125·4	101·9	55·8
MEAN FOR YEAR ...	126·2	101·1	57·5

Statement of Extra Meteorological Observations taken at Entebbe.

MONTH.	Earth Thermometer 1½ feet.			Earth Thermometer 4 feet.		
	7 A.M.	2 P.M.	9 P.M.	7 A.M.	2 P.M.	9 P.M.
1919.	°	°	°	°	°	°
JANUARY	78·6	79·3	79·1	78·0	77·9	77·7
FEBRUARY	77·0	76·8	77·2	77·8	77·9	77·6
MARCH	76·7	76·7	77·1	76·8	77·0	76·9
APRIL	75·5	75·5	75·8	76·6	76·8	76·8
MAY	73·8	73·8	76·5	76·6	76·5	76·5
JUNE	71·4	71·0	71·0	75·1	75·2	75·1
JULY	70·2	70·4	70·2	74·0	73·9	73·9
AUGUST	71·8	71·8	71·8	73·9	74·1	74·9
SEPTEMBER	73·9	74·0	74·0	74·8	74·8	74·8
OCTOBER	75·3	75·2	75·4	75·6	75·6	75·4
NOVEMBER	74·8	74·7	74·8	76·0	76·0	76·0
DECEMBER (3)	76·2	76·4	76·5	76·2	76·2	76·2
MEAN FOR YEAR ...	74·6	74·6	74·7	75·9	76·0	76·0

Statement Showing Average Hourly Velocity of Wind for 1919 between the Hours of:—

MONTH.	9 P.M. TO 7 A.M.	7 A.M. TO 2 P.M.	2 P.M. TO 9 P.M.
1919.			
JANUARY	3·5	7·0	9·0
FEBRUARY	2·6	3·6	4·4
MARCH	2·3	3·1	3·9
APRIL	3·8	3·5	2·4
MAY	2·2	4·2	2·8
JUNE	1·7	4·1	3·2
JULY	1·7	2·6	2·3
AUGUST	2·3	3·1	2·3
SEPTEMBER	2·3	3·6	2·8
OCTOBER	2·7	2·9	2·2
NOVEMBER	3·3	2·9	2·6
DECEMBER	2·4 (1)	3·1 (2)	2·8 (3)
MEAN FOR YEAR ...	2·6	3·6	3·4

(1) Records for 21 days. (2) Records for 23 days. (3) Records for 29 days.

MASAKA Meteorological Statement for the Year 1919.

MONTH.	7 A.M. Dry Bulb.	7 A.M. Wet Bulb.	2 P.M. Dry Bulb.	2 P.M. Wet Bulb.	9 P.M. Dry Bulb.	9 P.M. Wet Bulb.	Maximum Temperature.	Minimum Temperature.	Rain.	No. of days rain fell.
1919.	°	°	°	°	°	°	°	°	In.	
JANUARY ...	65·1	62·4	82·3	68·9	65·1	62·8	83·4	60·7	2·24	7
FEBRUARY ...	64·1	61·5	78·7	69·1	64·2	62·1	80·8	61·5	4·60	16
MARCH ...	64·9	62·7	79·4	73·8	64·7	62·3	81·1	62·1	3·78	10
APRIL ...	64·3	62·1	77·9	70·6	63·8	61·3	79·2	60·9	5·03	15
MAY ...	64·4	62·1	75·7	68·5	64·6	62·0	78·0	60·5	4·70	12
JUNE ...	63·6	60·6	76·6	66·2	62·3	60·9	78·3	60·4	·99	4
JULY ...	65·6	63·0	76·8	65·6	65·7	61·3	78·5	60·6	3·79	9
AUGUST ...	65·1	61·0	77·1	68·4	61·9	60·3	78·4	60·8	4·47	8
SEPTEMBER ...	64·5	62·6	78·1	67·1	64·0	61·8	79·3	60·4	5·15	11
OCTOBER ...	65·3	62·8	78·3	68·2	64·1	61·9	80·1	60·6	3·09	13
NOVEMBER ...	*65·0	62·5	80·1	68·8	64·0	61·5	81·5	60·4	3·83	13
DECEMBER ...	63·8	61·6	75·7	68·2	66·6	63·3	78·4	66·8	1·69	13
MEAN FOR YEAR	64.6	62·1	78·1	68·6	64·2	61·8	79·8	61·3	TOTAL 43·36	131

JINJA Meteorological Statement for the Year 1919.

MONTH.	7 A.M. Dry Bulb.	7 A.M. Wet Bulb.	2 P.M. Dry Bulb.	2 P.M. Wet Bulb.	9 P.M. Dry Bulb.	9 P.M. Wet Bulb.	Maximum Temperature.	Minimum Temperature.	Rain.	No. of days rain fell.
1919.	°	°	°	°	°	°	°	°	In.	
JANUARY ...	68·8	63·2	82·7	67·5	69·7	65·7	91·8	63·6	·79	4
FEBRUARY ...	66·0	64·9	79·6	72·7	67·2	65·3	82·4	61·2	7·12	11
MARCH ...	67·4	65·7	78·9	68·7	69·5	66·5	81·5	64·0	8·02	12
APRIL ...	67·6	65·6	79·2	69·9	70·0	66·9	82·2	63·9	4·58	10
MAY ...	66·5	64·8	77·2	69·2	67·4	64·7	79·3	63·7	4·36	5
JUNE ...	65·2	64·2	78·0	68·4	67·5	64·8	78·2	62·1	·68	3
JULY ...	65·1	63·5	75·5	66·9	65·8	63·5	78·1	60·7	3·24	10
AUGUST ...	62·4	61·2	76·5	67·1	66·0	63·6	81·3	62·2	3·30	7
SEPTEMBER ...	64·1	63·0	78·1	68·2	66·2	63·7	81·2	62·1	4·77	11
OCTOBER ...	65·6	63·6	81·2	69·3	68·3	64·8	83·2	64·7	1·61	8
NOVEMBER ...	64·2	63·0	79·3	69·2	66·0	64·0	81·5	62·0	8·31	12
DECEMBER ...	65·8	63·5	83·1	70·6	66·4	64·4	86·5	63·0	·61	5
MEAN FOR YEAR	65·7	63·9	79·1	69·1	67·5	64·8	82·3	62·8	TOTAL 47·39	98

MBARARA Meteorological Statement for the Year 1919.

MONTH.	7 A.M. Dry Bulb.	7 A.M. Wet Bulb.	2 P.M. Dry Bulb.	2 P.M. Wet Bulb.	9 P.M. Dry Bulb.	9 P.M. Wet Bulb.	Maximum Temperature.	Minimum Temperature.	Rain.	No. of days rain fell.
1919.	°	°	°	°	°	°	°	°	In.	
JANUARY ...	†67·5	†63·3	§78·6	§66·0	‡63·5	‡61·5	¶81·4	¶59·7	1·25	6
FEBRUARY ..	65·9	62·8	74·2	65·3	63·8	61·4	80·0	59·7	3·60	13
MARCH ...	68·0	64·8	79·1	65·4	63·5	61·5	81·2	59·7	3·69	10
APRIL ..	65·3	63·5	76·8	69·1	63·9	62·2	80·6	57·7	3·22	10
MAY ...	62·8	63·4	77·9	69·2	65·6	63·4	80·9	50·5	2·77	6
JUNE ...	67·9	62·1	79·4	72·5	67·6	64·6	81·1	51·6	·09	1
JULY ...	65·5	62·2	76·4	67·6	...	...	79·2	48·0	2·09	5
AUGUST ...	68·5	63·3	79·5	69·5	...	...	84·3	...	4·70	9
SEPTEMBER ...	66·1	63·8	75·2	67·9	...	...	80·9	...	6·39	11
OCTOBER ...	67·8	64·3	74·1	67·1	...	...	81·3	...	2·85	14
NOVEMBER ...	65·9	63·7	71·7	66·5	...	...	81·1	...	6·10	19
DECEMBER ...	64·9	62·5	75·4	68·1	...	...	81·3	...	3·60	14
MEAN FOR YEAR	66·3	63·3	76·5	67·7	64·7	62·4	81·1	55·3	TOTAL 40·35	118

* Records for 24 days. † Records for 24 days. ‡ Records for 25 days. § Records for 27 days.
¶ Records for 28 days.

FORT PORTAL Meteorological Statement for the Year 1919.

MONTH.	7 A.M. Dry Bulb.	7 A.M. Wet Bulb.	2 P.M. Dry Bulb.	2 P.M. Wet Bulb.	Maximum Temperature.	Minimum Temperature.	Rain.	No. of days rain fell.
1919.	o	o	o	o	o	o	In.	
JANUARY	66·1	63·4	73·8	66·4	77·1	56·5	1·97	8
FEBRUARY	64·2	61·9	73·6	64·2	76·0	54·8	7·17	14
MARCH *	65·2	62·4	73·7	65·8	76·0	54·8	3·64	7
APRIL	64·4	62·1	71·7	64·4	76·0	55·5	5·26	16
MAY	65·7	62·0	74·8	65·5	78·9	57·0	2·94	11
JUNE	69·7	60·6	73·6	64·3	77·0	55·4	1·92	6
JULY *	62·1	59·7	70·8	69·0	73·7	55·0	3·84	10
AUGUST	61·4	59·8	71·3	64·7	78·0	55·4	2·83	9
SEPTEMBER	63·5	60·9	71·0	64·3	76·0	53·8	10·47	14
OCTOBER	63·3	60·8	70·8	65·4	77·3	56·1	8·92	15
NOVEMBER	66·3	60·6	74·8	64·0	76·0	55·0	6·55	21
DECEMBER	63·7	61·0	74·5	66·0	76·9	54·0	3·61	12
MEAN FOR YEAR ...	64·6	61·3	72·9	65·3	76·4	55·3	TOTAL 59·12	143

GULU Meteorological Statement for the Year 1919.

MONTH.	7 A.M. Dry Bulb.	7 A.M. Wet Bulb.	2 P.M. Dry Bulb.	2 P.M. Wet Bulb.	Maximum Temperature.	Minimum Temperature.	Rain.	No of days rain fell.
1919.	o	o	o	o	o	o	In.	
JANUARY	69·7	60·9	87·8	66·8	92·2	62·0	·22	2
FEBRUARY	70·4	67·3	85·3	74·5	93·1	60·9	1·30	4
MARCH	70·0	66·7	84·1	73·7	92·9	60·7	5·47	6
APRIL	...	...	...	...	...	...	...	...
MAY	70·1	66·1	84·6	72·7	92·6	60·8	8·52	6
JUNE	69·2	66·3	85·1	70·4	85·1	59·5	8·40	11
JULY	68·7	63·7	80·1	67·5	80·7	60·5	10·23	19
AUGUST	68·7	62·6	83·3	65·8	81·5	61·3	5·05	10
SEPTEMBER	68·3	63·3	80·3	70·2	83·5	62·9	14·65	18
OCTOBER	69·4	63·7	81·2	70·3	83·9	62·3	12·57	16
NOVEMBER	68·6	62·4	81·7	71·0	83·3	61·8	9·24	16
DECEMBER	68·5	62·3	82·0	70·8	83·8	61·8	·60	3
MEAN FOR YEAR ...	69·2	64·1	83·2	70·3	86·6	61·3	TOTAL 76·25	111

KAMPALA Meteorological Statement for the Year 1919.

MONTH.	7 A.M. Dry Bulb.	7 A.M. Wet Bulb.	2 P.M. Dry Bulb.	2 P.M. Wet Bulb.	Maximum Temperature.	Minimum Temperature.	Rain.	No. of days rain fell.
1919.	o	o	o	o	o	o	In.	
JANUARY	69·5	67·3	82·4	78·1	86·7	69·1	·05	2
FEBRUARY	68·6	67·4	80·8	75·5	83·5	65·3	8·97	12
MARCH	69·1	67·6	80·1	75·9	82·0	66·3	8·18	19
APRIL	67·9	65·9	77·2	69·5	78·8	64·9	5·16	20
MAY	67·1	65·1	77·2	69·0	78·8	64·4	3·29	14
JUNE	66·7	63·5	76·9	67·1	78·5	64·0	1·79	6
JULY	65·9	63·0	76·6	70·6	77·2	62·3	1·36	10
AUGUST	65·1	62·3	79·1	75·4	80·4	62·1	3·46	11
SEPTEMBER	64·5	63·3	77·1	75·7	80·2	62·1	6·64	15
OCTOBER	65·7	64·1	81·0	72·8	82·3	63·1	3·45	15
NOVEMBER	64·6	62·7	78·6	71·8	81·3	62·5	5·04	16
DECEMBER	65·3	63·1	81·1	71·3	83·8	63·1	2·76	13
MEAN FOR YEAR ...	66·7	64·6	79·0	72·7	81·1	64·1	TOTAL 50·15	153

* Records for 19 days.

Appendix 18—*continued.*

MUBENDI Meteorological Statement for the Year 1919.

	7 A.M.		2 P.M.		9 P.M.					
MONTH.	Dry Bulb.	Wet Bulb.	Dry Bulb.	Wet Bulb.	Dry Bulb.	Wet Bulb.	Maximum Temperature.	Minimum Temperature.	Rain.	No. of days rain fell.
1919.	o	o	o	o	o	o	o	o	In.	
JANUARY ...	68·9	62·9	78·2	65·5	72·3	64·9	84·5	67·3	0·76	5
FEBRUARY ...	67·7	62·8	77·4	65·1	70·5	64·0	81·2	65·2	4·61	11
MARCH ...	67·7	62·7	75·3	66·3	70·4	64·2	82·2	66·1	5·01	13
APRIL ...	65·5	62·1	72·1	65·9	68·1	64·5	78·1	63·3	5·47	10
MAY ...	64·6	62·0	70·5	65·9	66·3	63·6	77·6	62·2	3·00	10
JUNE ...	65·2	61·5	72·1	64·5	65·9	62·9	77·3	63·2	1·09	4
JULY ...	64·5	61·1	70·0	64·5	65·4	62·7	75·2	62·7	2·77	5
AUGUST ...	65·5	61·9	72·9	65·3	66·9	63·1	77·4	63·6	5·10	7
SEPTEMBER	65·7	62·9	70·9	65·3	67·3	63·9	77·0	63·8	6·95	13
OCTOBER ...	66·2	63·1	71·2	66·2	67·8	64·2	77·6	63·6	5·45	15
NOVEMBER ...	66·6	63·6	71·7	66·4	68·6	64·6	78·7	64·0	3·79	9
DECEMBER ...	67·8	63·7	73·8	66·4	69·9	64·4	79·3	65·3	2·75	7
MEAN FOR YEAR	66·3	62·5	73·0	65·6	68·3	63·9	78·8	64·2	TOTAL 46·75	109

MASINDI Meteorological Statement for the Year 1919.

MONTH.	Maximum Temperature.	Minimum Temperature.	Rain.	No. of days rain fell.
1919.	o	o	In.	
JANUARY	85·3	62·2	0·25	3
FEBRUARY	85·8	62·3	3·02	9
MARCH	84·6	62·2	1·29	7
APRIL	84·9	62·3	2·49	14
MAY	82·8	62·2	3·17	14
JUNE	84·6	62·3	4·09	10
JULY	82·8	61·3	5·94	11
AUGUST	82·9	61·4	2·69	6
SEPTEMBER	80·6	61·0	8·55	19
OCTOBER	82·6	61·6	7·06	14
NOVEMBER	82·2	61·2	6·37	18
DECEMBER	83·8	60·6	0·56	6
MEAN FOR YEAR ...	83·6	61·7	TOTAL 45·48	131

Comparative Rainfall Statement, showing the Monthly Rainfall for the Year 1919, of Fifty Localities of the Uganda Protectorate.

MONTH.	Entebbe.		Jinja.		Mbarara.		Masaka.		Fort Portal.		Butiaba.		Masindi.		Gulu.		Kampala.		Mbale.		Mubendi.		Budo.		Bukona.	
	In.	No. of days	In.	No. of days	In.	No. of days	In.	No. of days	In.	No. of days	In.	No. of days	In.	No. of days	In.	No. of days	In.	No. of days	In.	No. of days	In.	No. of days	In.	No. of days	In.	No. of days
JANUARY ...	1·45	7	0·79	4	1·25	6	2·24	7	1·97	8	0·06	1	0·25	3	0·22	2	0·05	2	*Nil*	*Nil*	0·76	5	0·73	5	0·08	3
FEBRUARY ...	7·06	17	7·12	11	3·60	13	4·60	16	7·17	14	2·13	4	3·02	9	1·30	4	8·97	12	4·99	10	4·61	11	6·93	8	3·17	16
MARCH ...	9·00	17	8·02	12	3·69	10	3·78	10	3·64	7	1·98	2	1·29	7	5·47	6	8·18	19	3·47	7	5·01	13	10·27	11	4·08	9
APRIL ...	4·84	19	4·58	10	3·22	10	5·03	15	5·26	16	4·01	7	2·49	14	...	...	5·16	20	3·51	15	5·47	10	8·17	7	10·36	16
MAY ...	10·52	17	4·36	5	2·77	6	4·70	12	2·94	11	4·97	8	3·17	14	8·52	6	3·29	14	...	...	3·00	10	5·54	12	5·27	17
JUNE ...	5·97	11	0·68	3	0·09	1	0·99	4	1·92	6	1·17	6	4·09	10	8·40	11	1·79	6	...	...	1·09	4	1·54	6	3 19	8
JULY ...	7·72	16	3·24	10	2·09	5	3·79	9	3·84	10	4·15	7	5·94	11	10·23	19	1·36	10	...	...	2·77	5	3·14	9	2·51	11
AUGUST ...	2·70	11	3·30	7	4·70	9	4·47	8	2·83	9	0·88	6	2·69	6	5·05	10	3·46	11	...	...	5·10	7	2·96	11	3·70	13
SEPTEMBER ...	3·09	11	4·77	11	6·39	11	5·15	11	10·47	14	0·65	4	8·55	19	14·65	18	6·64	15	...	...	6·95	13	7·15	13	5·73	16
OCTOBER ...	3·55	15	1·61	8	2·85	14	3·09	13	8·92	15	4·22	10	7·06	14	12·57	16	3·45	15	..	...	5·45	15	2·84	12	6·46	15
NOVEMBER ...	2·97	9	8·31	12	6·10	19	3.83	13	6·55	21	4·11	12	6·37	18	9·24	16	5·04	16	...	...	3·79	9	4·09	13	7·05	16
DECEMBER ...	1·53	6	0·61	5	3·60	14	1·69	13	3·61	12	0·34	2	0·56	6	0·60	3	2·76	13	...	...	2·75	7	2·33	8	1·40	3
TOTAL ...	60·40	156	47·39	98	40·37	118	43·36	131	59·12	143	28·67	69	45·48	131	76·25	111	50·15	153	11·97	32	46·75	109	55·69	115	53·00	143

MONTH.	Namenage.		Lira.		Soroti.		Hoima.		Namukekera		Butiti.		Bukumi.		Rubaga.		Ngora.		Kisubi.		Kivuvu.		Kawolongojo		Magigye.	
	In.	No. of days	In.	No. of days	In.	No. of days	In.	No. of days	In.	No. of days	In.	No. of days	In.	No. of days	In.	No. of days	In.	No. of days	In.	No. of days	In.	No. of days	In.	No. of days	In.	No. of days
JANUARY ...	...	...	0·12	2	0·33	1	0·72	4	0·78	2	2·24	5	0·29	1	0·40	2	0·33	1	1·62	3	0·85	3	2·81	4	0·52	5
FEBRUARY ...	1·92	6	3·40	12	4·19	9	....	....	4·18	8	4·45	7	5·84	7	6·88	8	5·03	7	9·85	6	6·05	9	4·15	14	5·60	8
MARCH ...	...	...	2·24	7	4·58	10	3·98	12	5·50	13	2·55	7	4·80	6	8·83	9	3·27	3	8·02	12	5·34	14	5·24	17	4·68	11
APRIL ...	6·08	9	6·29	12	5·92	16	8·23	16	5·90	11	5·60	18	6·10	7	6·73	7	6·83	14	8·83	11	5·48	13	7·02	17	3·86	8
MAY ...	4·86	8	7·10	10	6·35	17	....	....	2·45	11	3·17	7	2·08	6	3·90	4	6·60	12	14·09	15	4·59	11	4·95	12	4·77	14
JUNE ...	2·06	6	3·59	9	7·52	10	3·57	7	1·24	4	1·65	5	2·11	5	3·05	5	5·78	9	3·47	9	0·78	4	1·89	7	1·38	4
JULY ...	4·14	10	7·29	17	8·90	21	....	....	1·72	9	2·37	11	1·94	7	2·03	2	8·72	12	3·73	8	2·00	12	2·25	11	1·83	8
AUGUST ...	...	...	4·06	11	2·70	14	...	....	5·57	7	5·12	12	6·46	9	3·47	4	4·21	8	1·12	5	6·56	11	7·17	12	5·84	14
SEPTEMBER ...	8·37	16	7·40	17	5·59	18	....	....	3·92	12	5·57	21	5·80	11	6·20	5	7·26	7	3·30	2	10·35	15	6·72	22	5·10	8
OCTOBER ...	...	...	3·06	12	4·75	11	....	....	4·44	12	4·73	18	5·66	13	3·59	5	2·84	10	4·99	8	4·03	13	....	....	5·94	19
NOVEMBER ...	...	...	9·96	15	7·02	18	....	....	3·96	12	5·63	16	5·31	11	6·15	7	7·15	9	10·90	5	8·04	14	....	....	7·77	23
DECEMBER ...	0·70	2	1·59	4	1·37	3	....	....	1·41	6	3·26	8	1·50	5	3·50	4	0·28	2	1·37	5	3·16	8	....	....	....	....
TOTAL ...	28·13	57	56·10	128	59·22	148	16·50	39	41·07	107	46·34	135	47·89	88	54·73	62	58·30	94	71·29	89	57·23	132	42·20	116	47·29	122

* Records for 17 days.

Comparative Rainfall Statement, showing the Monthly Rainfall for the year 1919, of Fifty Localities of the Uganda Protectorate—*continued.*

MONTH.	Nandere.		Moniko.		Bombo.		Bwavu.		Kakumiro.		Bunyaraguru.		Katigondo.		Masindi Port.		Nambeya.		Kitgum.		Kilclooney.		Namasagali.		Hoima River Estate.	
	In.	No. of days	In.	No. of days	In.	No. of days	In.	No. of days	In.	No. of days	In.	No. of days	In.	No. of days	In.	No. of days	In.	No. of days	In.	No. of days	In.	No. of days	In.	No. of days	In.	No. of days
January	0·36	4	2·06	3	0·16	2	0·55	2	0·73	3	3·33	11	2·45	6	0·10	1	0·34	2	*Nil*	*Nil*	3·56	12	0·60	1	0·38	3
February	3·69	9	5·01	8	4·04	11	5·58	10	4·48	10	1·76	5	4·70	15	2·71	9	2·17	7	0·20	2	4·10	10	3·09	8	5·76	13
March	7·08	12	2·96	9	4·30	6	5·12	12	5·32	7	4·79	11	1·45	12	2·46	12	6·55	9	2·50	7	2·69	8	8·91	10	1·98	6
April	5·61	16	6·01	13	6·04	14	5·98	14	6·33	13	5·63	13	4·04	9	3·85	8	*Nil*	*Nil*	5·03	13	7·86	19	3·86	12	3·45	13
May	3·45	12	4·91	5	2·49	9	6·01	14	1·63	5	7·38	11	3·68	13	4·28	8	3·29	11	9·76	9	3·16	13	10·71	16	5·07	18
June	2·09	4	3·43	8	1·80	4	2·81	8	2·67	4	0·56	4	1·58	6	1·26	5	1·26	4	6·41	10	0·12	1	1·07	5	3·79	10
July	3·32	9	2·81	8	2·16	9	2·62	13	1·94	8	3·64	5	2·09	11	2·99	8	6·67	14	10·86	13	5·39	8	3·90	11	7·83	17
August	8·09	10	6·09	9	9·72	13	3·34	8	6·05	8	1·25	6	2·10	5	3·12	7	7·10	12	2·38	6	3·21	10	2·09	6	7·35	17
September	7·69	12	10·50	14	6·53	8	6·41	15	5·67	13	7·11	19	3·95	15	4·56	11	8·95	18	3·65	10	9·28	21	5·53	12	7·34	21
October	9·26	22	7·35	11	6·00	17	1·63	14	5·17	16	6·57	16	4·26	12	5·14	12	5·26	16	3·23	7	5·05	18	7·02	15	7·12	21
November	5·66	21	4·14	11	4·49	16	3·90	16	5·17	13	9·23	25	3·47	14	6·05	14	7·06	14	6·74	16	7·77	26	5·32	11	7·59	18
December	3·04	6	2·35	9	3·47	7	3·11	12	1·91	9	5·09	14	2·56	11	0·93	3	0·73	4	0·93	4	5·03	13	0·79	3	0·46	6
Total	59·34	137	57·62	108	51·20	116	47·06	138	47·07	109	56·34	140	36·33	129	37·45	98	49·38	111	51·69	97	57·22	159	52·89	110	58·12	163

MONTH.	Nyondo.		Mutai.		Nsambya.		Bugondo.		Agu.		Lale.		Sisa.		Ndibulungi Estate.		Kabale.		Kizigo Estate.		Buye Estate.	
	In.	No. of days	In.	No. of days	In.	No. of days	In.	No. of days	In.	No. of days	In.	No. of days	In.	No. of days	In.	No. of days	In.	No. of days	In.	No. of days	In.	No. of days
January	0·62	2	1·31	2	0·14	2	*Nil*	*Nil*	0·06	2	*Nil*	*Nil*	1·79	...	1·64	3	2·80	9	1·10	2	1·31	3
February	4·53	9	3·16	6	7·86	10	3·18	5	0·75	8	6·56	7	5·98	...	4·32	10	4·90	13	6·27	7	3·06	7
March	6·90	11	4·16	7	8·52	14	3·95	7	1·02	4	4·71	10	8·43	...	2·67	11	6·52	9	4·18	9	2·87	7
April	8·79	14	7·76	9	7·00	12	3·25	13	....	....	4·91	12	7·20	...	6·65	16	5·29	14	4·06	11	9·11	20
May	8·48	14	2·37	4	2·41	12	6·28	11	....	....	6·35	12	7·38	17	3·06	14	1·72	6	....	...	3·80	16
June	3·79	10	1·03	2	1·72	6	4·27	8	....	....	4·31	11	0·69	...	0·29	4	*Nil*	*Nil*	....	...	1·31	8
July	7·32	13	2·67	5	1·34	6	7·34	14	....	....	8·49	13	6·42	4	2·09	12	2·91	6	....	...	1·51	12
August	2·96	11	3·07	5	1·71	7	2·16	8	....	....	7·12	10	2·39	10	4·86	8	9·47	10	....	...	5·79	11
September	2·81	8	4·58	7	6·11	18	6·75	11	....	....	6·62	18	3·95	10	8·79	20	2·15	8	....	...	6·71	21
October	3·26	10	3·43	6	2·22	14	5·86	10	....	....	3·06	8	2·08	3	5·40	14	4·13	9	....	...	5·85	17
November	2·82	9	8·65	9	8·39	16	7·71	16	....	....	5·14	18	4·01	...	4·11	16	3·31	10	....	...	6·01	22
December	1·11	4	3·16	3	1·87	9	0·08	2	....	....	0·77	5	4·01	5	1·51	7	2·71	8	....	...	2·59	14
Total ...	53·39	115	45·35	65	49·31	126	50·83	105	1·83	14	58·04	124	53·32	49	45·39	135	45·91	102	15·61	29	50·12	158